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SELECTED WATER RESOURCES ABSTRACTS

VOLUME 8, NUMBER 6
MARCH 15, 1975

W75-02751 -- W75-03300

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SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 8, NUMBER 6
MARCH 15, 1975

W75-02751 – W75-03300

The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

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As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

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FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, D. C. 20240

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02 WATER CYCLE
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03 WATER SUPPLY AUGMENTATION AND CONSERVATION
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05 WATER QUALITY MANAGEMENT AND PROTECTION
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06 WATER RESOURCES PLANNING
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ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

1. NATURE OF WATER

1B. Aqueous Solutions and Suspensions

ELECTRONIC STRUCTURE AND STATES OF PURE AND DOPED WATER,
Delaware Univ., Newark. Dept. of Physics.
F. Williams, and B. Baron.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-238 312, $3.25 in paper copy, $2.25 in microfiche. Completion Report, December 14, 1974. 22 p, 8 fig, 2 tab, 19 ref. OWRT B-005-DEL(1).

Descriptors: Aqueous solutions, *Bromides, Hydrogen bonding, *Ice, *Iodides, Physical properties, Spectroscopy, *Water properties, *Water structure, Optical properties, Electrical properties, Model studies.
Identifiers: Amorphous ice, Electronic structures, X-ray photoelectron spectroscopy.

The electronic states of water and of I(-) and Br(-) aqueous solutions are described in terms of an amorphous semiconductor model. An anomalous temperature dependence on the Urbach exponential absorption edge for the intra-molecular electronic excitations is noted. The extrinsic optical absorptions of I(-) and Br(-) doped water are observed to have Urbach tails. The concentration dependence of the I(-) absorption reveals the onset of resonance broadening at C greater than 2.3 molar. The Bohr radius of the excited state is estimated be 9 A(o) and the energy of the excited state, approximately 0.4 eV below the conduction band of water. X-ray photoelectron spectroscopy of thin films of amorphous ice reveals that the 0 1s core and 1a sub 1 molecular levels are shifted downward upon condensation by 0.5 and 1.8 eV, respectively. The valence band of amorphous ice is formed from the 2a sub 1 1b sub 2 and 1b sub 1 molecular levels, having a width of approximately 5 eV. The work function of amorphous ice is 6.4 eV.
W75-02883

2. WATER CYCLE

2A. General

WATER FOR THE HUMAN ENVIRONMENT, VOLUME III, TECHNICAL SESSIONS.
Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Champaign, Illinois. 471 p.

Descriptors: Water resources, *Conferences, *Water resources development, *Management, *Water quality, Water pollution control, *Planning, *Environment, Economics, Social aspects, Watershed management, Water conservation, Great Lakes, Water reuse, Flood control, Lakes, Erosion, Lake shores, Waste treatment, Waste water treatment, Groundwater, Remote sensing, Water supply, Eutrophication.
Identifiers: *Human environment, Developing countries.

Water for the human environment was discussed at a world congress held at Chicago in 1973. Volume III contains the papers presented in four technical sessions. Subjects discussed included water quality problems, water resources management, eutrophication, environmental aspects, water supply, lake shore erosion, planning, water resources development, economic aspects, social aspects, waste water reclamation, water treatment, waste treatment, watershed management, water conservation, pollution control, remote sensing, and groundwater aspects. (See W75-02752 thru W75-02789) (Humphreys-ISWS)
W75-02751

THE WORLD WATER BALANCE, INTERNATIONAL HYDROLOGICAL PROGRAM (I.H.P.) ACTIVITIES, AND REMOTE SENSING APPLICATIONS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
V. V. Salomonson, and A. Rango.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 1-13. 2 tab, 31 ref.

Descriptors: *Water balance, *Remote sensing, Planning, Water resources, Satellites(Artificial), Electromagnetic waves, Monitoring, Microwaves, Infrared radiation, Water supply, International waters, Meteoric water, *International Hydrologic Decade.

Increasing demands on the world water supplies dictated that a means of continually assessing the global water balance needed to be developed and implemented. Remote sensing technology has been able to assess the location or areal extent of water in several spectral regions, and the volume of the water within that environment has been rated within four categories. The categorizations have been limited to the portion of the electromagnetic spectrum extending from the visible wavelengths through the microwave region. Very few possibilities for applying remote sensing over large geographical regions seemed to exist outside these spectral intervals. Observations in the microwave portion of the spectrum held great promise for global monitoring of atmospheric temperature, water vapor, and liquid water. Variations of these parameters were monitored effectively through clouds. Developments achieved in the microwave and in the far infrared made it possible to globally monitor the spatial and temporal variations in total atmospheric water content. It was difficult, however, to develop programs and insure that the data would be processed, analyzed, interpreted, and disseminated to water resources agencies for definitive decisions on allocating valuable water resources. (See also W75-02751) (Roberts-ISWS)
W75-02752

WATER FOR TOMORROW'S CITIES: POLICY VARIABLES IN RESIDENTIAL WATER RESOURCES MANAGEMENT,
Toronto Univ. (Ontario). Dept. of Geography.
For primary bibliographic entry see Field 3D.
W75-02753

EUTROPHICATION PROBLEMS IN THE ST. LAWRENCE GREAT LAKES,
Wisconsin Univ., Milwaukee. Center for Great Lakes Studies.
For primary bibliographic entry see Field 5C.
W75-02754

PROBLEMS OF GREAT LAKES SHORE EROSION,
Wisconsin Univ., Milwaukee. Dept. of Mechanics.
For primary bibliographic entry see Field 4D.
W75-02755

WASTEWATER RECLAMATION UNDER TROPICAL CONDITIONS,
Asian Inst. of Tech., Bangkok, (Thailand). Dept. of Environmental Engineering.
For primary bibliographic entry see Field 5D.
W75-02756

WASTE WATER EFFECTS ON A LARGE BODY OF WATER,
Vsesoyusnyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
For primary bibliographic entry see Field 5B.
W75-02757

WATER QUALITY PROBLEMS IN BANGLADESH,
Bangladesh Directorate of Public Health Engineering, Dacca.
For primary bibliographic entry see Field 5G.
W75-02758

GAS SUPERSATURATION PROBLEM IN THE COLUMBIA RIVER,
Army Engineer Div. North Pacific, Portland, Oreg. Water Quality Section.
For primary bibliographic entry see Field 5C.
W75-02759

THE ENVIRONMENTAL PROBLEMS IN AN URBAN FLOOD CONTROL PLANNING,
Taiwan Water Resources Planning Commission, Taipei.
For primary bibliographic entry see Field 6F.
W75-02760

ENVIRONMENTAL ASSESSMENT: AN AID IN WATER RESOURCE MANAGEMENT,
Battelle Memorial Inst., Columbus, Ohio.
For primary bibliographic entry see Field 6G.
W75-02761

SOME NECESSARY CONDITIONS FOR EQUILIBRIUM AMONG MANKIND, ENVIRONMENT, AND ECONOMY,
Illinois State Environmental Protection Agency, Springfield. Div. of Water Pollution Control.
For primary bibliographic entry see Field 6B.
W75-02762

ENVIRONMENTAL CONSIDERATIONS IN WATER RESOURCES DEVELOPMENT,
Bureau of Reclamation, Denver, Colo.
For primary bibliographic entry see Field 6G.
W75-02763

MANAGEMENT OF THE WATER CYCLE IN ENGLAND AND WALES,
Watson (J. D. and D. M.), London (England).
For primary bibliographic entry see Field 6E.
W75-02764

PLANNING, MANAGEMENT AND FINANCING OF INTERSTATE RIVER VALLEY PROJECTS IN INDIA,
Madhya Pradesh (India). Irrigation Dept., Bhopal.
For primary bibliographic entry see Field 6B.
W75-02765

SOCIOECONOMIC IMPACTS OF THE FEDERAL RECLAMATION PROGRAM IN THE UNITED STATES,
Bureau of Reclamation, Washington, D.C. Div. of Water and Land.
For primary bibliographic entry see Field 6B.
W75-02766

PRICE AND OTHER SELECTED ECONOMIC AND SOCIO-ECONOMIC FACTORS AS DETERMINANTS OF HOUSEHOLD WATER CONSUMPTION,
Mississippi Univ., University. Dept. of Economics.
For primary bibliographic entry see Field 6B.

W75-02767

WATER SUPPLY/SEWERAGE--A REQUIRED SOCIAL OVERHEAD FACILITY IN DEVELOPING COUNTRIES,
Camp, Dresser and McKee International, Inc., Boston, Mass.
For primary bibliographic entry see Field 6B.
W75-02768

EVALUATION OF THE BENEFITS OF RURAL WATER SUPPLY PROJECTS IN TANZANIAN VILLAGES,
Duke Univ., Durham, N. C. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6B.
W75-02769

WATER RESOURCES RESEARCH POLICIES FOR THE GREAT LAKES,
Great Lakes Basin Commission, Ann Arbor, Michigan.
For primary bibliographic entry see Field 6E.
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NOTES ON A HISTORY OF WATERUSE,
Wisconsin Univ., Madison. Coll. of Agricultural and Life Sciences.
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Madhya Pradesh Irrigation Dept., Raipur (India). Irrigation Mahanadi Bodhghat Hasdeo Project.
For primary bibliographic entry see Field 6G.
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IMPACT OF TRADITIONAL WATER RESOURCES TECHNOLOGY ON THE HUMAN ENVIRONMENT,
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For primary bibliographic entry see Field 6G.
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WATER RESOURCE DEVELOPMENT AND ENVIRONMENT: AN APPROACH TO IMPACT ANALYSIS,
Waterloo Univ. (Ontario). Dept. of Man-Environment Studies.
For primary bibliographic entry see Field 6A.
W75-02774

AN APPROACH TO ASSESSING ENVIRONMENTAL IMPACTS,
Waterloo Univ. (Ontario). Dept. of Man-Environment Studies.
For primary bibliographic entry see Field 6G.
W75-02775

THE DESIGN AND APPLICATION OF A MANAGEMENT INFORMATION SYSTEM FOR DRINKING WATER QUALITY DATA,
Philadelphia Water Dept., Pa.
For primary bibliographic entry see Field 5A.
W75-02776

WATER RESOURCES DEVELOPMENT AND FLOOD CONTROL ALONG THE DANUBE RIVER,
Technical Univ. of Budapest (Hungary). Inst. of Water Management and Hydraulic Construction.
For primary bibliographic entry see Field 4A.
W75-02777

THE RHINE-MAIN-DANUBE CONNECTION--A WATERWAY FOR EUROPE,
Rhein-Main-Donau A.G., Munich (West Germany). Managing Board.
For primary bibliographic entry see Field 4A.
W75-02778

WASTEWATER RECLAMATION AND REUSE IN ISRAEL,
Technion - Israel Inst. of Tech., Haifa (Israel).
For primary bibliographic entry see Field 5D.
W75-02779

WASTEWATER RECLAMATION AND REUSE IN THE SUISUN MARSH CALIFORNIA, U.S.A.,
Bureau of Reclamation, Sacramento, Calif.
For primary bibliographic entry see Field 5D.
W75-02780

THE POTENTIAL POLLUTION INDEX AS A TOOL FOR RIVER WATER QUALITY MANAGEMENT,
International Reference Centre for Community Water Supply, The Hague (Netherlands).
For primary bibliographic entry see Field 5A.
W75-02781

THE EFFECT OF SELF PURIFICATION OF FLOWING WATER,
Seoul National Univ. (Republic of Korea). Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-02782

WATER SUPPLY AND SEWER SYSTEM FOR THE CITY OF CHICAGO,
Chicago Dept. of Water and Sewers, Ill.
For primary bibliographic entry see Field 5F.
W75-02783

A NEW METHOD OF WATER AND SEWAGE PURIFICATION,
Polish Academy of Sciences, Gdansk. Inst. of Hydraulic Research.
For primary bibliographic entry see Field 5D.
W75-02784

SURFACE WATER POLLUTION BY DISCHARGE OF COMBINED SEWER SYSTEMS, SWISS METHOD OF CALCULATION, (IN FRENCH),
Infraconsult S.A., Bern (Switzerland).
For primary bibliographic entry see Field 5B.
W75-02785

LOWER COST METHODS OF WATER AND WASTE TREATMENT IN LESS DEVELOPED COUNTRIES,
Oklahoma Univ., Norman.
For primary bibliographic entry see Field 5D.
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GROUND-WATER-QUALITY MONITORING SYSTEMS,
ENWATS, Cambridge, Mass.
For primary bibliographic entry see Field 5A.
W75-02787

CONCEPTS OF WATERSHED MANAGEMENT: THE SODIUM BUDGETS OF LAKE CHAMPLAIN,
Vermont Univ., Burlington. Lake Champlain Studies Center.
For primary bibliographic entry see Field 5B.
W75-02788

WATER CONSERVATION AND POLLUTION CONTROL IN INDIA--AN ENVIRONMENTAL APPROACH,
For primary bibliographic entry see Field 4A.
W75-02789

RESULTS OF THE U.S. CONTRIBUTION TO THE JOINT U.S./U.S.S.R. BERING SEA EXPERIMENT,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 2C.
W75-02821

FORECASTING RAINFALL AND SNOWMELT FLOODS ON UPPER MIDWEST WATERSHEDS,
Minnesota Univ., Minneapolis. St. Anthony Falls Hydraulic Lab.
For primary bibliographic entry see Field 2E.
W75-02887

COMBINED CONDUCTION-RADIATION ENERGY TRANSFER IN STAGNANT WATER,
Purdue Univ., Lafayette, Ind. Heart Transfer Lab.
For primary bibliographic entry see Field 5B.
W75-02902

HYDROGEOCHEMICAL INVESTIGATION OF SELECTED WATERSHEDS IN SOUTHWESTERN MONTANA,
Montana Bureau of Mines and Geology, Butte.
For primary bibliographic entry see Field 5B.
W75-02983

DETERMINATION OF THE RAIN RUNOFF WITH SPECIAL REGARD TO THE RUNOFF FROM INDIVIDUAL PLOTS. PART 2: APPLICATION OF ASSUMED RAIN DURATION TO SMALL AREAS--METHOD OF SUMMATION OF RUNOFF LINES--STORAGE CAPACITY IN MIXED RAINWATER SEWERS, (IN GERMAN),
K. Pfeil.
Heizung Leuftung Haustechnik, Vol 25, No 4, p 131-134, 1974.

Descriptors: *Runoff, *Equations, Model studies, Rainfall-runoff relationships, Floods, Sewers, Combined sewers, Pipelines.
Identifiers: Rainwater sewers.

Problems of the determination of storm runoff from small catchment surfaces such as individual plots by the calculation rain and the cumulative curve methods are described. Rainfall durations over 15 minutes should be considered for urban sewer systems and for large catchment areas only. The dimensioning of pipelines is often based upon actual precipitation statistics for the given area rather than on general formulae. The exponential runoff curves for circular catchment areas fall very slightly in the period immediately after the end of the rainfall and drop very rapidly later. The cumulative curve procedure permits the determination of the flood waves in the individual sewer sections and of the storm runoff for the entire catchment area. It has been demonstrated lately that the storm runoff is shifted in time rather than reduced by the sewer volume. (Takacs-FIRL)
W75-02998

STEADY STATE INCREASING SPATIALLY VARIED FLOW OVER A SIMULATED VEGETATED SURFACE,
Corps of Engineers, Fort Worth, Tex. Hydrology Section.
For primary bibliographic entry see Field 2E.
W75-03007

BIOLOGICAL EFFECTS IN THE HYDROLOGICAL CYCLE,
Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana. 391 p.

Descriptors: *Hydrologic cycle, *Environment, *Hydrobiology, *Conferences, Hydrology, Hydrologic aspects, Human population, Ecosystems, Watersheds(Basins), Evaporation, Interception, Precipitation(Atmospheric), Evapotranspiration, Soil water movement, Eutrophication, Nutrients, Infiltration, Remote sensing, Runoff, Hydrographs, Vegetation effects, Soil erosion, Model studies, Water yield, Watershed management, Groundwater recharge, Irrigation, Forests, Waste water disposal, Management, Decision making, Training, Soil management, Political aspects, Recreation.
Identifiers: *Biological effects.

The biological effects related to the land phase of the hydrological cycle were discussed at a seminar held at Purdue University, West Lafayette, Indiana in 1971. The subject areas discussed were: (1) the ecological system, (2) alteration by man's activities, (3) biological-physical relationships of hydrological processes, (4) identification and measurement techniques, (5) management of the biological component for select watershed response, (6) decision-making and policies, and (7) new aids for teaching hydrology. (See W75-03024 thru W75-03040) (Humphreys-ISWS)
W75-03023

BIOLOGICAL HYDROLOGIC SYSTEMS,
Office of Water Resources Research, Washington, D.C.
For primary bibliographic entry see Field 4D.
W75-03024

PROBLEMS IN DECISION-MAKING IN HYDROLOGY,
Vermont Dept. of Water Resources, Montpelier. Agency of Environmental Conservation.
For primary bibliographic entry see Field 6B.
W75-03025

HYDROLOGIC SIMULATION AND THE ECOLOGICAL SYSTEM,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
D. D. Huff.
In: Biological Effects in the Hydrological Cycle, Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana. p 18-30. 6 fig, 11 ref.

Descriptors: *Hydrology, *Ecosystems, On-site investigations, Hydrologic aspects, Model studies, Hydrologic properties, Hydrologic systems, Watersheds(Basins), Aquatic environment, Nutrients, Environment, Environmental effects, *Wisconsin, Mathematical models.
Identifiers: *Biological effects, *Lake Wingra(Wisc).

Hydrologic processes both influence and are influenced by ecosystems. Study of interrelationships between hydrologic processes and ecosystems could be called ecosystem hydrology. Ecosystem hydrology encompasses two distinct areas of concern. The first is the effect of hydrologic processes and conditions on ecosystems. This area includes the role of water in the exchange of materials between the biotic and abiotic portions of the environment. It also includes consideration of changes in ecosystems precipitated by modification of the hydrologic environment. The second area involves the effects which ecosystems exert on hydrologic processes. Lake Wingra ecosystem hydrologic studywas described. This highly integrated research project is an intensive study of the processes, both physical and biological, that regulate the productivity and stability of land and water ecosystems at one point within the decisuous forest biome. General areas of research include hydrology, terrestrial and aquatic energetics, and terrestrial and aquatic nutrients. In addition, a portion of the effort is devoted to systems modeling and simulations. The ultimate objective is to gain enough knowledge to complete construction of an ecosystem simulation model for the lake basin. (See also W75-03023) (Humphreys-ISWS)
W75-03026

DYNAMICS OF HUMAN POPULATIONS,
Purdue Univ., Lafayette, Ind. Natural Resources and Environmental Science Program.
For primary bibliographic entry see Field 6B.
W75-03027

POLLUTION CONTROL--NOW AND IN THE FUTURE,
Purdue Univ., Lafayette, Ind. School of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-03028

NUTRIENT INPUTS AND THEIR RELATIONSHIP TO ACCELERATED EUTROPHICATION IN LAKE MICHIGAN,
Michigan Univ., Ann Arbor. Great Lakes Research Div.
For primary bibliographic entry see Field 5C.
W75-03029

A SUMMARY OF RAINFALL INTERCEPTION BY CERTAIN CONIFERS OF NORTH AMERICA,
Forest Service (USDA), Wenatchee, Wash. Forest Hydrology Lab.
J. D. Helvey.
In: Biological Effects in the Hydrological Cycle, Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana. p 103-113. 8 tab, 47 ref.

Descriptors: *Interception, *Conifers, Canopy, Hydrologic data, Rainfall, Stemflow, Throughfall, Red pine trees, Loblolly pine trees, Ponderosa pine trees, Hemlock trees, Fir trees, Hardwood, Hydrology, Watersheds(Basins), Forest watersheds, Demonstration watersheds, Water balance.
Identifiers: Shortleaf pine trees.

Available interception results from coniferous stands growing in North America were summarized in order to determine gross similarities and differences in interception losses between species. The summary begins with interception data which may include measurements of throughfall, stemflow, and/or litter interception in addition to gross rainfall. Results were presented as regression equations because percentage values have limited meaning unless storm size distribution is known. These results have important implications for the watershed manager when maximum water yield is an important consideration. Fir and hemlock species not only prevent more water from reaching the forest floor, but they may also transpire more water than pine species. More study is needed of the hydrologic relationships of the forest floor because few such studies have been made. As new studies are reported, the average equations presented in this review can be refined and the need for additional studies determined. (See also W75-03023) (Humphreys-ISWS)
W75-03030

INTERACTIONS OF MICROBIAL METABOLISM AND SOIL PHYSICAL PROPERTIES AND THEIR SIGNIFICANCE IN SOME HYDROLOGICAL PROCESSES,
Agricultural Research Service, Baton Rouge, La. Soil and Water Conservation Research Div.
For primary bibliographic entry see Field 2G.
W75-03031

OBSERVING PLANT ROOT GROWTH,
Agricultural Research Service, Auburn, Ala. Soil and Water Conservation Research Div.
For primary bibliographic entry see Field 2I.
W75-03032

THE NEED FOR NATURE PRESERVES,
Purdue Univ., Lafayette, Ind. Dept. of Biological Sciences.
A. A. Lindsey.
In: Biological Effects In The Hydrological Cycle, Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana. p 259-264, 3 ref.

Descriptors: *Conservation, *Preservation, *Natural resources, *Land resources, Social values, Recreation, Economics, Education, Ecology, Soil science, *Land use, Intangible benefits, Environment, Geology.
Identifiers: Nature preserves, Natural areas.

A nature preserve was defined as a natural area that has been dedicated or committed as such, in what is intended to be a permanent status, by a governmental, corporate, or private owner. A natural area was defined as any outdoor site that contains an unusual biological, geological, or scenic feature or else illustrates common principles of ecology remarkably well. Uses and values of natural areas were outlined under the broad subject areas of: (1) scientific research, (2) educational and cultural programs for youths and adults and nature centers, (3) aesthetic and perceptive-recreational benefits, (4) practical benefits, and (5) long-range socio-economic benefits. The uses and values of natural areas should be examined with two criteria in mind: (1) which, if any, of the uses and values can be quantified accurately for representation in a traditional benefit/cost ratio, and (2) which items do society consider important. Improvement of decision making process is needed for the entire range of personal, social, cultural, and scientific values. (See also W75-03023) (Humphreys-ISWS)
W75-03033

THE RECREATIONAL USES OF WATER,
Indiana Univ., Bloomington. Dept. of Recreation and Park Administration.
For primary bibliographic entry see Field 6B.
W75-03034

RENOVATION OF MUNICIPAL WASTEWATER THROUGH FOREST IRRIGATION,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 5D.
W75-03035

RENOVATING SEWAGE EFFLUENT BY GROUND WATER RECHARGE,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 5D.
W75-03036

EVALUATING THE EFFECTS OF WATER YIELD MANAGEMENT,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 3B.
W75-03037

VEGETATIVE MANAGEMENT AND WATER YIELD RELATIONSHIPS,
California Univ., Davis. Dept. of Water Science and Engineering.
For primary bibliographic entry see Field 3B.
W75-03038

ENVIRONMENTAL POLICY AND POLITICAL DECISIONS: THE RECONCILIATION OF FACTS, VALUES, AND INTERESTS,
Colorado State Univ., Fort Collins. Dept. of Political Science.
For primary bibliographic entry see Field 6E.
W75-03039

NEW AIDS AND METHODS FOR TEACHING HYDROLOGY,
Texas Univ., Austin. Dept. of Civil Engineering.
W. L. Moore.
In: Biological Effects In The Hydrological Cycle, Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana. p 379-391, 2 fig, 13 ref.

Descriptors: *Engineering education, *Hydrology, Training, Education, Model studies, Hydraulic models, Computer models, Methodology, Instrumentation, Equipment.
Identifiers: *Teaching aids, *Self-paced instruction, Case studies.

Teaching aids outlined were: instruments and equipment used hydrological, in measurements; hydrological maps; photo-hydrological interpretation and mapping; hydraulic laboratory equipment and models; physical, analog, and digital models of surface runoff; groundwater models; representative and experimental basins; and motion pictures, film loops, slides, overhead transparencies, charts, and diagrams. Two new teaching methods for instruction in hydrology were discussed. First, self-paced instruction. This method is a system of individualized instruction that guides the student through a series of learning units at his own pace and that requires mastery of each unit before proceeding to the next. Success of the method in a variety of technical fields suggests that it should be applied to teaching hydrology. Second, the case studies method has been successful in other professions. Well written case studies dealing with the solution of hydrologic problems and the making of hydrologic investigations should be applied as an aid in teaching hydrology. (See also W75-03023) (Humphreys-ISWS)
W75-03040

A WATER QUALITY MODEL FOR A CONJUNCTIVE SURFACE-GROUNDWATER SYSTEM,
Florida Univ., Gainesville. Dept. of Environmental Engineering Sciences.
For primary bibliographic entry see Field 5B.
W75-03042

DETERMINE STREAMFLOWS FROM GEOMORPHIC PARAMETERS,
Washington State Univ., Pullman. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 2E.
W75-03103

2B. Precipitation

THE WORLD WATER BALANCE, INTERNATIONAL HYDROLOGICAL PROGRAM (I.H.P.) ACTIVITIES, AND REMOTE SENSING APPLICATIONS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 2A.
W75-02752

HYDROLOGIC DATA FOR URBAN STUDIES IN THE HOUSTON, TEXAS METROPOLITAN AREA, 1972,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 2E.
W75-02813

RECORDS OF PRECIPITATION, WATER LEVELS, AND GROUND-WATER RECHARGE TO THE EDWARDS AND ASSOCIATED LIMESTONES, SAN ANTONIO AREA, TEXAS, 1972-73,
Geological Survey, San Antonio, Tex.
For primary bibliographic entry see Field 2F.
W75-02818

THE MIXING OF RAIN WITH NEAR-SURFACE WATER,
Wisconsin Univ., Madison. Dept. of Meteorology, and Wisconsin Univ., Madison. Civil and Environmental Engineering.
D. F. Houk, and T. Green, III.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-238 377, $5.25 in paper copy, $2.25 in microfiche. Technical Report WIS WRC 74-10, November 1974. 105 p, 38 fig, 12 tab, 54 ref, append. OWRT B-060-WIS(1). 14-31-001-3666.

Descriptors: *Raindrops, *Simulated rainfall, *Mixing, *Turbulence, Heat transfer, *Monomolecular films, Films, *Impact(Rainfall), Kinetics, Rain, *Evaporation control.

The effects of rain on calm near-surface waters were examined experimentally. Simulated rainfall consisted of uniform raindrops 2.2 mm, 3.6 mm, and 5.5 mm in diameter, and variable-size raindrops which were formed either by using the 2.2 mm, 3.6 mm, and 5.5 mm drops together, or by allowing the 2.2 mm drops to fall through a mesh screen to form less than or equal to 1.5 mm drops. Rain mixes the near-surface waters. The depth of mixing was directly proportional to the kinetic energy flux of the raindrops, and to time to the 1/3 power, and inversely proportional to the buoyancy flux through the surface. For the same kinetic energy flux, larger drops caused a deeper mixed layer. Predictive equations for the depth of mixing and rain dilution were developed. The action of rain in removing the hexadeconal normally used to suppress evaporation on reservoirs was also studied. Variable-size, 3.6 mm, and 5.5 mm drops removed the hexadeconal from the water surface in less than 15 minutes. Smaller drops had not completely removed the hexadeconal after one hour of rain.
W75-02897

THE PROBLEM OF VERTICAL DISTRIBUTION OF PRECIPITATION, ESPECIALLY IN AREAS WITH GREAT HEIGHT DIFFERENCES--ADDITIONAL ANALYSIS AND RESULTS,
Uppsala Univ. (Sweden). Dept. of Physical Geography.
B. E. Ryden.
In: Distribution of Precipitation In Mountainous Areas, Volume I; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No 326 (2 Vol), Geneva, Switzerland, p 184-187, 1973. 7 fig.

Descriptors: *Precipitation(atmospheric), *Mountains, Gages, Runoff, Topography, Distribution patterns, Areal, Precipitation gages, Rainfall, Summer.
Identifiers: Areal distribution, *Sweden.

A network of simple petrol drum precipitation gages was established to measure the precipitation falling on a mountainous drainage basin in Sweden. A positive correlation between total precipitation and increasing altitude up to 1830 meters above sea level was found. (See also W75-01961)
W75-03235

DISTRIBUTION OF PRECIPITATION IN MOUNTAINOUS AREAS, VOLUME II,
Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No 326 (2 Vol), Geneva, Switzerland, 1972. 587 p.

Descriptors: *Precipitation(atmospheric), *Conferences, *Orography, *Meteorology, *Rainfall disposition, Mountains, Snow, Measurement, Precipitation gages, Rainfall, Evaporation, Topography, Winds, Distribution patterns, Precipitation intensity, Hydrologic aspects, Networks, Hydrologic data, Areal, Remote sensing, Statistical methods, Time series analysis, Instrumentation.
Identifiers: *Physiographic factors.

Volume II contains 50 technical papers preprinted for presentation at a symposium held at Geilo, Norway in 1972. The five broad subject areas covered were: (1) instruments and measuring techniques, (2) orographic influence on distribution of precipitation-- meteorological factors and approaches, (43) orographic influences on distribution of precipitation--physiographic factors and hydrologic approaches, (4) precipitation network design in mountainous areas, and (5) methods of computation of areal precipitation. Volume I contains the proceedings, key papers presented on each broad subject item, a summary of discussions, symposium resolutions, and seven additional technical papers. (See W75-03237 thru W75-03241) (Humphreys-ISWS)
W75-03236

A CONTRIBUTION TO THE PROBLEM OF PRECIPITATION MEASUREMENTS IN MOUNTAINOUS AREAS,
Hydrometeorological Inst. of Croatia, Zagreb, (Yugoslavia).
B. Kirigin.
In: Distribution of Precipitation in Mountainous Areas, Vol II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No 326 (2 Vol), Geneva, Switzerland, P 1-12, 1973. 4 fig, 3 tab, 9 ref.

Descriptors: *Precipitation(atmospheric), *Mountains, *Winds, *Rain gages, *Snow, Snow cover, On-site data collections, Measurement, Meteorology, Instrumentation.
Identifiers: *Yugoslavia.

Special precipitation measurements were performed in Yugoslavia during the period from 1955-1971 by using various types of rain gages at the mountain meteorological station Zavizan (1594m). The resulting decade and monthly precipitation amounts showed definite differences due to the strenghtened wind effects as well as to the increase of snow forms of precipitation, rime formations, and snow drifting. It was found that in the mountainous regions of Yugoslavia special mountain rain gages with shielding ring or the Hellmann rain gages of Wolfle system should be used above 900 m. (Jones-ISWS)
W75-03237

WINTER PRECIPITATION GAGE CATCH IN WINDY MOUNTAINOUS AREAS,
Wyoming Univ., Laramie. Water Resources Research Inst.
P. A. Rechard.
In: Distribution of Precipitation in Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norwasy, Jy, July 31-August 5, 1972. World Metrological Organization Publication No 326 (2 Vol), Geneva, Switzerland, p 13-26, 1973. 7 fig, 2 tab, 12 ref.

V 8 6 M R 1 5 7 5 UMI

Descriptors: *Precipitation(atmospheric), *Snowfall, *Mountains, *Wind, *Snow, Hydrologic budget, Raingages, Snow management, *Wyoming, Hydrologic aspecs, Wind velocity.
Identifiers: *Snow fencing, *Blow fence, Pole Mountain.

The input quantity for water-budget and water management hydrologic analyses is usually the amount of precipitation received on the watershed. The accuracy of estimates of areal precipitation is dependent on the accuracy of the catch by each gage. Investigation by the Water Resources Research Institute at the University of Wyoming has shown that the catch of snowfall by precipitation gages under windy conditions is dependent on the protective shielding provided the gage. Where natural forest protecton is not available, it is important to be able to provide artificial shielding. The Wyoming Institute has studied the use of snow fencing to provide shielding against adverse wind effects for standard precipitation gages. A possible design, designated 'blow fence,' was proposed. While true catch is still an unknown quantity, it was shown that a gage without any shielding will probably catch one-third of that caught by a gage located in a well protected opening in a forest. A gage with an alter-type shield will catch about two thirds, while a gage shielded by the proposed design will catch about the equivalent of the standard and the precentage of standard catch will not vary greatly with wind speed. (See also W75-03236) (Jones-ISWS)
W75-03238

THE EFFECT OF WIND ON THE RAINFALL CATCH,
Water Research Association, Marlow (England).
M. J. Green, and P. R. Helliwell.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No 326 (2 Vol), Geneva, Switzerland, p 27-46, 1973. 9 fig, 4 tab, 15 ref.

Descriptors: *Precipitation(Atmospheric), *Rain gages, *Winds, Rainfall, Raindrops, Photography, Distribution patterns, Instrumentation, Mountains, Measurement.
Identifiers: *Raindrop trajectories, *Mk 2 rain gauge, Jevons effect, England(Medmenham).

Wind profiles and raindrop trajectories above the British Meteorological Office Mk 2 rain gauge were measured in a wind tunnel. Wind speeds ranged from 1 to 15 m/sec and raindrops in size from 1 to 3 mm in diameter. The zone of influence was found to be 75 mm upwind of the leading rim of the orifice and 240 mm above the orifice. The maximum percentage increase of air speed above the Mk 2 gauge is 20%. The increase in area of a gauge required to catch the same amount of rainfall as a gauge without any local wind effects is over 60% for a 2.2 mm diameter drop in a 10 m/s wind field. Raindrops in natural field conditions do not fall at their terminal velocities in the lower layers of the atmosphere. (See alwo W75-03236) (Jones-ISWS)
W75-03239

THE DEE WEATHER RADAR PROJECT,
British Meteorological Office, Bracknell (England).
T. W. Harrold, R. Bussell, and W. A. Grinsted.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No 326 (2 Vol), Geneva, Switzerland, p 47-61, 1973. 6 fig, 11 ref.

Descriptors: *Precipitation(Atmospheric), *Radar, *Rain gages, *Mountains, *River regulation, Hydrology, Snowfall, Orography, Water management(Applied), Rainfall, Reflectance, Measurement.
Identifiers: Wales(River Dee), Distrometers.

The objective of the project is to develop a radar system to measure areal precipitation in real time on a space and time scale appropriate to the hydrological requirements for water management and river regulation. The characteristics of the radar and ancillary equipment, particularly the area rain gauge network, used in the project were described, together with details of the operational procedures specially related to the mountainous nature of the area. Data acquired will have many secondary research applications on the nature of rainfall in mountainous terrain. Preliminary results of a comparison for 1-hour data from the radar and rain gauges showed a mean point error of 15% with the rain gauges as the standard. Some of the error may be associated with gauge errors. (See also W75-03236) (Jones-ISWS)
W75-03240

AN OPTOGRAPHIC TECHNIQUE FOR EVALUATING THE EXPOSURE OF PRECIPITATION GAGE SITES IN MOUNTAINOUS AREAS,
West Virginia Univ., Morgantown. Div. of Forestry.
For primary bibliographic entry see Field 7B.
W75-03241

2C. Snow, Ice, and Frost

METHODS OF AVALANCHE CONTROL ON WASHINGTON MOUNTAIN HIGHWAYS--THIRD ANNUAL REPORT,
Washington Univ., Seattle. Geophysics Program; and Washington Univ., Seattle. Dept. of Civil Engineering.
C. B. Brown, R. J. Evans, T. Fox, E. R. LaChapelle, and D. M. McClung.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 303, $3.75 in paper copy, $2.25 in microfiche. Washington State Highway Department Research Program Report 8.4, November 1973. 187 p, 36 fig, 7 tab, 41 ref, 5 append. DOT Y-1301.

Descriptors: *Avalanches, *Washington, *Highways, *Snow management, Stress, Strain, Creep, Snowpacks, Snow, Safety, Weather, Weather patterns, Decision making, Vegetation, Dendrochronology, Frequency, Distribution patterns, Planning.
Identifiers: *Cascade mountains.

Six reports were presented on different aspects of avalanche formation. Report titles and conclusions are: (1) Some considerations for Avalanche Defense Design for the Washington Cascades. Results were presented in a form which can be readily applied to the design of avalanche defense structures in the Cascade Mountains. (2) Incorporation of Glide and Creep Measurements into Snow Slab Mechanics. Field data were introduced into a theoretical treatment of slab avalanche formation. (3) Avalanches and Synoptic Weather Situations in the Cascades during the winters of 1971-72 and 1972-73. A firm quantitative basis was established for the well-known effects of warm winter storms on snow stability. (4) Indication of Snow Avalanche Periodicity through Interpretation of Vegetation Patterns in the North Cascades, Washington. Useful baseline data were provided for the extension of future studies and the relation of avalanche return intervals to vegetation patterns in the Cascades was illustrated. (5) A visit to the Swiss Federal Institute for Snow and Avalanche Research. A trip to inspect avalanche research and defense systems in Switzerland was summarized. (6) Decision Methods. The findings and recommendations for management of avalanche hazards on the North Cascade Highway were summarized. (Humphreys-ISWS)
W75-02803

THE REMOTE SENSING PROGRAM REQUIRED FOR THE AIDJEX MODEL,
Cold Regions Research and Engineering Lab., Hanover, N. H.
For primary bibliographic entry see Field 7B.
W75-02815

COMPARISON OF SHEAR STRESS CALCULATIONS BETWEEN TWO PROFILE METHODS USING SOME DRAG-PLATE MEASUREMENTS,
Geological Survey, Tacoma, Wash.
C.-H. Ling.
AIDJEX Bulletin No 27, Washington University Division of Marine Resources, p 84-89, November 1974. 2 fig, 1 tab, 5 ref.

Descriptors: *Winds, *Roughness(Hydraulic), *Ice, *Sea ice, Ice cover, Ice, Movement, Kansas.
Identifiers: *Ice dynamics, Arctic Ice Dynamics Joint Experiment.

When several wind-velocity profiles are used to find a single value for the surface roughness parameter of a surface, the confidence interval narrows considerably and the values of the friction velocity seem more consistent with real measurements than when roughness is allowed to vary for each profile. These roughness values were compared with direct stress measurements as determined from a drag plate. The drag-plate measurements were made on the Great Plains of Kansas. (Knapp-USGS)
W75-02816

RESULTS OF THE U.S. CONTRIBUTION TO THE JOINT U.S./U.S.S.R. BERING SEA EXPERIMENT,
Geological Survey, Tacoma, Wash.
W. J. Campbell, T. C. Chang, M. G. Fowler, P. Gloersen, and P. M. Kuhn.
Goddard Space Flight Center, National Aeronautics and Space Administration Preprint X-910-74-141 (preprint of papers to be presented at Symposium of May 13-17, 1974, Leningrad) May 1974. 193 p.

Descriptors: *Sea ice, *Meteorology, *Remote sensing, Conferences, Ice cover, Movement, Ice, Data collections, United States.
Identifiers: *Bering Sea, USSR, Bering Sea Experiment, US-USSR joint efforts.

These six papers contain results of the U.S. contribution to the joint U.S. contribution to the joint U.S./U.S.S.R. Bering Sea Expedition, conducted by the two countries during the period February 15 to March 10, 1973. The topics of the papers are synoptic ice dynamics and atmospheric circulation during the Bering Sea Experiment; mesoscale description for the principal Bering Sea Ice Experiment; variation of ice morphology of selected mesoscale test areas during the Bering Sea Experiment; ice thickness distribution as inferred from infrared and microwave remote sensing during the Bering Sea Experiment; microwave radiometric determination of atmospheric parameters during the Bering Sea Experiment; and analysis of the Convair-990 passive microwave observations of the sea states during the Bering Sea Experiment. (See W75-02822 thru W75-02825) (Knapp-USGS)
W75-02821

SYNOPTIC ICE DYNAMICS AND ATMOSPHERIC CIRCULATION DURING THE BERING SEA EXPERIMENT,
Geological Survey, Tacoma, Wash.
W. J. Campbell, P. Gloersen, and R. O. Ramseier.
In: Results of the U.S. Contribution to the Joint U.S./U.S.S.R. Bering Sea Experiment: Goddard Space Flight Center, National Aeronautics and Space Administration Preprint X-910-74-141, Paper No 1, p 2-30, May 1974. 13 fig, 1 tab, 3 ref.

Descriptors: *Sea ice, *Movement, *Winds, *Synoptic analysis, Ocean currents, Ocean circulation, Ice cover, Ice, Meteorology.
Identifiers: *Ice dynamics, *Bering Sea.

The atmospheric circulation which occurred during the Bering Sea Experiment, February 15 to March 10, 1973, in and around the experiment area was analyzed and related to the macroscale morphology and dynamics of the sea ice cover. The ice cover was very complex in structure, being made up of five ice types, and underwent strong dynamic activity. Synoptic analyses show that an optimum variety of weather situations occurred during the experiment: an initial strong anticyclonic period (6 days), followed by a period of strong cyclonic activity (6 days), followed by weak anticyclonic activity (3 days), and finally a period of weak cyclonic activity (4 days). The data of the mesoscale test areas observed on the four sea ice option flights and ship weather and drift data give a detailed description of mesoscale ice dynamics which correlates well with the macroscale view: anticyclonic activity advects the ice southward with strong ice divergence and a regular lead and polynya pattern; cyclonic activity advects the ice northward with ice convergence, or slight divergence, and a random lead and polynya pattern. (See also W75-02821) (Knapp-USGS)
W75-02822

MESOSCALE DESCRIPTION FOR THE PRINCIPAL BERING SEA ICE EXPERIMENT,
Department of the Environment, Ottawa (Ontario).
R. O. Ramseier, P. Gloersen, W. J. Campbell, and T. C. Chang.
In: Results of the U.S. Contribution to the Joint U.S. U.S./U.S.S.R. Bering Sea Experiment: Goddard Space Flight Center, National Aeronautics and Space Administration Preprint X-910-74-141, Paper No 2, p 32-73, May 1974. 22 fig, 1 tab, 2 ref.

Descriptors: *Remote sensing, *Sea ice, *Microwaves, Radar, Ice cover, Salinity, Sea water.
Identifiers: *Bering Sea.

Experimental data acquired in a sea ice experiment in the Bering Sea on March 5, 1973 are described and analyzed. Sea ice properties (salinity, density, and temperature profiles) acquired by measurements on the surface along the three diagonals of the U.S.A., Overlap, and U.S.S.R. experiment areas on that date are tabulated, along with photographic records of the various test sites. Some select sea ice samples were returned to the home laboratory for more detailed study, including microphotography and the measurement of the complex dielectric constant, which are also described. The upper frazil ice layer is largely responsible for the microwave signatures at all the wavelengths studied. In surveying the microwave data, it was found that no multiyear ice was evident in the test area. However, a new ice signature similar to that of multiyear ice was found to occur over grey ice on which the existence of a film of moisture was discovered during the surface measurements. The moisture film is attributed to a high salt concentration at the surface of the ice, and hence a lowering of the melting point, as a result of sublimation of the ice from the surface. Analysis of the 1.55 cm radiometer data resulted in a determination of an 82% ice concentration in the U.S.A. test area on March 5, 1973. (See also W75-02821) (Knapp-USGS)
W75-02823

VARIATION OF ICE MORPHOLOGY OF SELECTED MESOSCALE TEST AREAS DURING THE BERING SEA EXPERIMENT,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
P. Gloersen, R. Ramseier, W. J. Campbell, T. C. Chang, and T. T. Wilheit.
In: Results of the U.S. Contribution to the Joint U.S./U.S.S.R. Bering Sea Experiment: Goddard Space Flight Center, National Aeronautics and Space Administration Preprint X-910-74-141, Paper No 3, p 76-101, May 1974. 14 fig, 3 tab.

Descriptors: *Sea ice, *Freezing, Ice cover, Ice, Remote sensing, Data collections.
Identifiers: *Bering Sea.

Surface and remotely obtained data for the Bering Sea Experiment sea ice missions on February 15, 20, and 28, 1973 were analyzed. The major findings are that the sea ice consisted entirely of the first-year and younger variety and that the ice concentration varied from 74% to 90% during this period within a roughly constant geographical area, 100 km on a side. (See also W75-02821) (Knapp-USGS)
W75-02824

ICE THICKNESS DISTRIBUTION AS INFERRED FROM INFRARED AND MICROWAVE REMOTE SENSING DURING THE BERING SEA EXPERIMENT,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
P. Gloersen, R. Ramseier, W. J. Campbell, P. M. Kuhn, and W. J. Webster, Jr.
In: Results of the U.S. Contribution to the Joint U.S./U.S.S.R. Bering Sea Experiment: Goddard Space Flight Center, National Aeronautics and Space Administration Preprint X-910-74-141, Paper No 4, p 104-121, May 1974. 6 fig, 2 tab, 6 ref.

Descriptors: *Remote sensing, *Sea ice, *Microwaves, Radar, Ice cover, Ice, Convection, Heat transfer, Freezing.
Identifiers: *Bering Sea.

Remote sensing of the sea ice surface at wavelengths of 10 micrometers and 21 cm was investigated for the purpose of determining the feasibility of obtaining ice thickness from the radiometric measurements. Distinguishable radiometric signatures were obtained for thin ice at 21 cm, but the signatures do not follow a simple model consisting of a thin sheet of sea ice with parallel faces separating the ocean from the atmosphere. In fact, the signatures are distinguishable for ice thicknesses an order of magnitude larger than predicted on the basis of this simple model. It is speculated that the microwave signature pertains only to either the freeboard portion of the sea ice or the frazil layer. At 10 micrometers, the observations appear to fit the theoretical predictions rather well. The model consists of heat transfer from the ocean to the turbulent portion of the atmosphere through two layers, a slab of ice in which the heat transfer rate varies with temperature and the temperature varies with vertical position in the slab, and a nonturbulent boundary layer in the atmosphere directly above the ice in which the major heat transport is convective. Major difficulties in using infrared remote sensing for sea ice thickness determinations are obscuration of the sea ice surface by ground haze and obtaining reliable values for the air temperature at the bottom of the turbulent atmosphere. (See also W75-02821) (Knapp-USGS)
W75-02825

ELECTRONIC STRUCTURE AND STATES OF PURE AND DOPED WATER,
Delaware Univ., Newark. Dept. of Physics.
For primary bibliographic entry see Field 1B.
W75-02883

MODELING PERIODICALLY SURGING GLACIERS,
Department of Science, Melbourne (Australia). Antarctic Div.
W. F. Budd, and B. J. McInnes.
Science, Vol 186, No 4167, p 925-927, December 6, 1974. 2 fig, 7 ref.

Descriptors: *Glaciology, *Model studies, Movement, *Glaciers, Velocity, *Surges, Length, Ice, Frequency.
Identifiers: Thickness.

A numerical model was developed which produced periodic surging as a characteristic of some glaciers for a certain accumulation and bedrock distribution in contrast to the normal steady state for nonsurging glaciers. Results were presented to illustrate how the magnitude of changes in the length, thickness, and velocity of surging glaciers can be simulated by the model. (Humphreys-ISWS)
W75-03085

EFFECT OF SNOW COVER ON UPWARD MOVEMENT OF SOIL MOISTURE,
National Weather Service, Silver Spring, Md. Hydrologic Research and Development Lab.
For primary bibliographic entry see Field 2G.
W75-03106

GREAT LAKES ICE FORECASTING,
National Weather Service, Silver Spring, Md. Ocean Services Div.
C. R. Snider.
NOAA Technical Memorandum NWS OSD 1, July 1974. 106 p, 5 fig, 46 ref, 7 append.

Descriptors: *Great Lakes, *Forecasting, *Lake ice, *Iced lakes, *Navigation, Ice, Lakes, Climatic changes.
Identifiers: *Ice forecasting, Ice break-up, Freezing degree days, Thermal regime, Ice formation, Ice terminology, Synoptic analysis.

This manual has been revised to include new technical procedures implemented during the 1971-72 and 1972-73 winter season. During this period an intensified Great Lakes marine weather and ice forecasting effort was made to support winter navigation of the Great Lakes in connection with ice information activities of the Demonstration Program. This manual also includes samples of the latest graphic and written weather and ice forecast products which are provided daily by the Detroit NWS Forecast Office. (NOAA)
W75-03177

WINTER PRECIPITATION GAGE CATCH IN WINDY MOUNTAINOUS AREAS,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 2B.
W75-03238

2D. Evaporation and Transpiration

ESTIMATION OF POTENTIAL AND CROP EVAPOTRANSPIRATION,
Utah State Univ., Logan. Dept. of Agricultural and Irrigation Engineering.
G. H. Hargreaves.
Transactions of the American Society of Agricultural Engineers, Vol 17, No 4, p 701-704, July-August 1974. 2 tab, 13 ref.

Descriptors: *Evapotranspiration, *Evaporation, Evaporation pans, Lysimeters, Weather data, Climatic data, Irrigation practices, Weather, Equations, Estimating, Forecasting.
Identifiers: *Crop evapotranspiration, *Potential evapotranspiration.

The relative importance of weather elements on potential evapotranspiration was analyzed. A methodology was presented requiring a minimum of data, providing for simplicity of computation, and presenting a good fit of lysimeter evapotranspiration measurements for a wide range of climatic conditions. Grass evapotranspiration or potential evapotranspiration can be approximated from a

variety of equations. The most frequently used elements for computation include mean air temperature and some form of radiation and/or day length. Other elements are of relatively minor importance in low elevation arid locations. For these locations the simple equation, PET=(MF)T, required only temperature measurements and produced satisfactory results. In humid areas a correction for mean relative humidity was added. (Roberts-ISWS)
W75-03090

MODELING EVAPOTRANSPIRATION AND SOIL MOISTURE,
Agricultural Research Service, Columbia, Mo.
K. E. Saxton, H. P. Johnson, and R. H. Shaw.
Transactions of the American Society of Agricultural Engineers, Vol 17, No 4, p 673-677, July-August 1974. 7 fig, 2 tab, 17 ref.

Descriptors: *Evapotranspiration, *Soil moisture, *Model studies, *Soil-water-plant relationships, *Transpiration, *Evaporation, Computer models, Soil water, Moisture stress, Interception, Root distribution, Infiltration, Runoff, Hydrologic cycle, Watersheds(Basins).
Identifiers: *Digital simulation models, *Soil water extraction.

A digital model was presented which was developed to compute daily actual evapotranspiration and soil moisture profiles from inputs of daily potential evapotranspiration and crop and soil moisture characteristics. Interception evaporation, soil evaporation, and plant transpiration were computed separately by several relationships; then these values were combined to provide daily actual evapotranspiration estimates. Soil moisture was redistributed by tension-conductivity relationships. The model was calibrated and verified by 3 years of data from March through November from two research watersheds, one in corn and the other in brome grass. The calculated actual evapotranspiration amounts and soil moisture profiles agreed sufficiently with observed data to be quite useful for hydrologic research and models. (Sanderson-ISWS)
W75-03097

RELATION BETWEEN TRANSPIRATION AND LEAF MASS OF TREES, (IN RUSSIAN),
Crimean Landslide Contract Administration, Yalta (USSR).
V. E. Rudakov.
Ekologiya, Vol 4, No 6, p 85-86, 1973, Illus.
Identifiers: *Aspen, *Birch, *Leaf mass(Trees), *Oaks, *Transpiration, Trees(Age).

Data on the relation between the amount of water transpired and leaf mass of birch, oak and aspen trees as a function of the age of the trees are given. The relationships obtained were independent of age, since at any age their deviations from the average amount of water transpired did not exceed the accuracy of finding the magnitude of transpiration. They do not depend on the weather conditions of those years in which the transpiration and fresh leaf weight were determined. The increase of the dry mass of the plants is proportional to the magnitude of transpiration.--Copyright 1974, Biological Abstracts, Inc.
W75-03252

SCHOLANDER PRESSURE BOMB TECHNIQUE TO ASSESS THE RELATIVE LEAF WATER STRESS OF 'ORLANDO' TANGELO SCION AS INFLUENCED BY VARIOUS CITRUS ROOTSTOCKS,
Florida Univ., Gainesville. Dept. of Fruit Crops.
T. E. Crocker, W. D. Bell, and J. F. Bartholic.
Hort Science, Vol 9, No 5, p 453-455, October 1974. 3 fig, 1 tab, 6 ref. OWRT B-014-FLA(5). 14-31-0001-3868.

Descriptors: *Evapotranspiration, Evapotranspiration control, Energy budget, Water balance, Analytical techniques, *Pressure measuring instruments, Leaves, *Citrus fruits, Lemon, Orange, Instrumentation.
Identifiers: *Scholander pressure bomb method, *Leaf water stress, *Tangelo.

A modified Scholander pressure bomb was sensitive enough to detect significant differences in relative leaf water stress among 'Orlando' tangelo (Citrus reticulata Blanco x C. paradisi Mact.) on several rootstocks. Leaf water potential for the rootstocks ranged from -7.9 bars for rough lemon (Citrus jambhiri Lush.) to -13.7 bars for those on trifoliata orange (Poncirus trifoliata Raf.). There was a diurnal pattern in leaf water stress. Modifications and procedures for the pressure bomb measurements are described. (Morgan-Florida)
W75-03295

2E. Streamflow and Runoff

DYE STUDIES THROUGH USE OF ADVANCEMENTS IN AN AERIAL OPTICAL MECHANICAL IMAGING SYSTEM,
Battelle Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 7B.
W75-02792

TEMPORAL REFERENCE LINE HOLOGRAMS FROM A WATER SURFACE,
Texas Univ., Austin. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 2L.
W75-02793

FLOOD OF OCTOBER 1973 IN ENID AND VICINITY, NORTH-CENTRAL OKLAHOMA,
Geological Survey, Oklahoma City, Okla.
For primary bibliographic entry see Field 7C.
W75-02810

SELECTED HYDROLOGIC DATA, SAGEHEN CREEK BASIN NEAR TRUCKEE, CALIFORNIA, 1954-72,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 7C.
W75-02811

WATER QUALITY AND STREAMFLOW CHARACTEISTICS, RARITAN RIVER BASIN, NEW JERSEY,
Geological Survey, Trenton, N.J.
For primary bibliographic entry see Field 5B.
W75-02812

HYDROLOGIC DATA FOR URBAN STUDIES IN THE HOUSTON, TEXAS METROPOLITAN AREA, 1972,
Geological Survey, Austin, Tex.
D. E. Ferguson.
Available from District Chief, USGS, Federal Bldg, 300 E. 8th St., Austin, Tex. 78701. Open-file report (Texas District), May 1974. 247 p, 17 fig, 15 tab, 2 ref.

Descriptors: *Urban hydrology, *Texas, *Basic data collections, Hydrologic data, Rainfall-runoff relationships, Urban runoff, Storm runoff, Precipitation(Atmospheric).
Identifiers: *Houston(Tex).

The objectives of the Houston urban hydrology study are to determine, on the basis of historical data and hydrologic analyses, the magnitude and frequency of flood peaks and flood volume; to determine the effect of urban development on flood peaks and volume; and to ascertain the variation in water quality for different flow conditions and different seasons. This report presents the basic hydrologic data collected in the Houston urban area for the 1972 water year (October 1971 to September 1972). Large variations in area rainfalls and extreme variations in rainfall intensities occurred during the current year. Individual station totals ranged from 31.6 inches at the Houston-Satsuma rain gage to 58.2 inches at the Houston-Independent Heights rain gage. Both rain gages are located in the northern section of the metropolitan area. The rainfall intensities produced by the storm of March 20 were the highest recorded locally for intervals of 1 and 2 hours. Runoff for the 1972 water year was above normal in the northern section of the area as a result of the storm of March 20 and of frequent moderately heavy rains in May. (Knapp-USGS)
W75-02813

WATER FOR INDUSTRIAL DEVELOPMENT IN BENTON, LAFAYETTE, MARSHALL, PONTOTOC, TIPPAH, AND UNION COUNTIES, MISSISSIPPI,
Geological Survey, Jackson, Miss.
R. Newcome, Jr.
Mississippi Research and Development Center report, 1974. 73 p, 29 fig, 16 tab, 28 ref, append.

Descriptors: *Industrial water, *Mississippi, *Groundwater, *Surface waters, Water supply, Streamflow, Water quality, Water yield, Water resources, Supply, Streams, Aquifers.
Identifiers: *Benton County(Miss), *Lafayette County(Miss), *Marshall County(Miss), *Pontotoc County(Miss), *Tippah County(Miss), *Union County(Miss).

Water for industrial use is available from streams or aquifers throughout Benton, Lafayette, Marshall, Pontotoc, Tippah, and Union Counties, Mississippi. A few streams could supply more than 20 million gallons per day without storage, but in most of the area storage would be required for supplies of that magnitude. Supplies as great as 1 million gallons per day could be obtained from wells in most places; 5 million gallons per day or greater would be more easily obtained from Tertiary aquifers in the western part of the area than from Cretaceous aquifers in the east. The water in the streams and aquifers is suitable for many industrial uses. Dissolved-solids concentrations are usually less than 100 milligrams per liter in the streams and are little greater than that in the groundwater from the Tertiary aquifers. Water from Cretaceous aquifers has higher mineral concentrations and is harder than most of the other groundwater and surface water. Silica concentrations are usually less than 20 milligrams per liter in water from all sources, and color is not likely to be a problem. (Knapp-USGS)
W75-02814

SEDIMENT DISCHARGE IN THE LAKE TAHOE BASIN, CALIFORNIA, 1973 WATER YEAR,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2J.
W75-02817

HYDROLOGY AND TROUT POPULATIONS OF COLD WATER RIVERS OF MICHIGAN AND WISCONSIN,
Geological Survey, Madison, Wis.
G. E. Hendrickson, and R. L. Knutilla.
Wisconsin Academy of Sciences, Arts and Letters, Vol 62, p 181-193, 1974. 1 fig, 2 tab, 12 ref.

Descriptors: *Michigan, *Wisconsin, *Water temperature, *Trout, *Water quality, Statistics, Streamflow, Regression analysis, Runoff, Discharge(Water), Stream fisheries, Sport fishing, Productivity, Fish, Salmonids, Fish populations, Hydrology.
Identifiers: Hydrologic parameters.

In the cold waters of Michigan and Wisconsin, statistical multiple-regression analyses show significant relationships between trout populations and hydrologic parameters. Parameters showing the higher levels of significance are temperature, hardness of water, percentage of gravel bottom, percentage of bottom vegetation, variability of streamflow, and discharge per unit drainage area. Trout populations increase with lower levels of annual maximum water temperatures, with increase in water hardness, and with increase in percentage of gravel and bottom vegetation. Trout populations also increase in discharge per unit drainage area. Most hydrologic parameters were significant when evaluated collectively, but no parameter, by itself, showed a high degree of correlation with trout populations in regression analyses that included all the streams sampled. Regression analyses of stream segments that were restricted to certain limits of hardness, temperature, or percentage of gravel bottom showed improvements in correlation. Analyses of trout populations, in pounds per acre and pounds per mile and hydrologic parameters resulted in regression equations from which trout populations could be estimated with standard errors of 89% and 84%, respectively. (Knapp-USGS)
W75-02819

METHOD AND APPARATUS FOR MEASURING WATER CURRENTS,
For primary bibliographic entry see Field 7B.
W75-02849

FORECASTING RAINFALL AND SNOWMELT FLOODS ON UPPER MIDWEST WATERSHEDS,
Minnesota Univ., Minneapolis. St. Anthony Falls Hydraulic Lab.
K. Kim, C. S. Chu, C. E. Bowers, and D. G. Baker.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-238 374, $6.25 in paper copy, $2.25 in microfiche. Project Report No 151. June 1974. 145 p, 82 fig, 13 tab, 32 ref, 3 append. OWRT B-077-MINN(2). 14-31-0001-3902.

Descriptors: *Flooding, *Flood control, *Flood forecasting, *Mathematical models, Simulation analysis, Watershed management, Rainfall, Snowmelt, Optimization, Rainfall-runoff relationships, Minnesota, *Large watersheds, Computer models.
Identifiers: *Minnesota River basin, Le Sueur watershed(Minn).

The objective was the application and evaluation of mathematical simulation models relative to snowmelt floods in large watersheds in the upper Mid-west. The SSARR and HEC-1 models were fitted to 15 watersheds of the 16,200 square-mile Minnesota River Basin. The Kentucky model was fitted to one 129 square-mile watershed, and the new NWSRFS was fitted to the 1100 square-mile Le Sueur watershed for summer runoff conditions. The SSARR model simulated snowmelt floods very well for the selected years of 1965, 1967, and 1969. As this model had no optimizing routines, it was difficult to fit to the watersheds, but after use with several years' data, fitting proceeded at a fairly rapid pace. The model shows considerable promise for this area and should be operated with data for other years. The HEC-1 model is equipped with optimizing routines and was relatively easy to fit to the watersheds. However, it was prepared for one primary rainfall event and has no procedure for soil moisture depletion between rains. It also is a very useful tool for snowmelt flood forecasting, but requires an independent analysis of soil moisture and runoff conditions at the time of snowmelt. The Kentucky Fortran version of the Stanford Watershed Model was tested on only one watershed with only moderate success. Further testing would be necessary for a final evaluation. The new NWSRFS model is based in part on time increments selected for large watersheds. This model was fitted to the Le Sueur watershed for snow-free periods. Its performance was excellent for those conditions, and it deserves further study in this area. (Waelti-Minnesota)
W75-02887

PROCEDURES FOR DETERMINING THE ORDER OF DEPENDENCE IN STREAMFLOW RECORDS,
Arizona Univ., Tucson. Dept. of Mathematics.
For primary bibliographic entry see Field 4A.
W75-02903

A STOCHASTIC MODEL FOR DAILY RIVER FLOWS IN AN ARID REGION,
Arizona Univ., Tucson. Dept. of Systems and Industrial Engineering.
S. J. Yakowitz.
Water Resources Research, Vol 9, p 1271-1285, October 1973. 7 fig, 2 tab, 26 ref. OWRR A-023-ARIZ(3).

Descriptors: *Flood recurrence interval, *Streamflow, *River flow, *Arid lands, *Stochastic processes, Time series analysis, Meteorology, Droughts, Rivers, *Arizona, Simulation analysis.
Identifiers: Rillito River(Ariz).

The purpose was to construct a model for daily river flow in an arid climate. Meteorological and other physical data are used to develop a simulated flow trajectory to be compared to the actual streamflow record. If done successfully, the model can be used to estimate and predict the length of time between floodings, the amount and size of structures needed to contain the floods, the amount of water available for irrigation each month and other significant factors. The Rillito River study described the need for considerable data about the river to be studied and the necessity for identification and inferences to vary with the nature of the river. Results showed that simulated flow trajectories and statistical texts compared reasonably closely with actual flow records. (Mastic-Arizona)
W75-02907

WAVE MEASURING APPARATUS,
Ministry of National Defence, Ottawa (Ontario). (assignee)
For primary bibliographic entry see Field 7B.
W75-02931

STEADY STATE INCREASING SPATIALLY VARIED FLOW OVER A SIMULATED VEGETATED SURFACE,
Corps of Engineers, Fort Worth, Tex. Hydrology Section.
P. K. Rodman, C. E. Rice, and J. E. Garton.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 17, No 1, p 148-151, February 1974. 1 fig, 3 tab, 7 ref. OWRT A-030-OKLA(2).

Descriptors: Hydrology, *Prediction, *Runoff, Friction, *Simulation analysis, Equations, Research, Rainfall, Water supply, Pipes, Flow, Systems analysis, Mathematical models, *Forecasting.
Identifiers: *Time distribution, Peak flow, *Vegetated surface, Sprinkler system.

The so-called hydraulic approach to predicting time distribution of runoff and peak flow has a serious deficiency: the problem of estimating roughness coefficients for overland flow. Complete, accurate solutions to the momentum and continuity equations may not be realized until friction relationships are known for different watershed surfaces. Presented are the research analysis and results of a study to determine the friction relationships with uniform flow and steady state spatially varied flow conditions for a simulated vegetated surface and to use these to predict water surface profiles for steady state spatially varied flows. Tests were conducted in an indoor channel lined with Perma-Grass; a pipe and a sprinkler water supply system were both used. The tests were run at three slopes with three rainfall intensities per slope. For the spatially varied flow tests, one test was run with rainfall only and four tests had a base flow. In most of the tests the contribution from rainfall to the total flow was small. Frictional relationships obtained from uniform flow and spatially varied flow tests were used in a complete momentum equation, a simplified momentum equation, the energy equation, and the Manning equation to predict the water surface profiles for the spatially varied flow rates. All the equations predicted the profiles with acceptable accuracy. (Bell-Cornell)
W75-03007

STAGE RECORDER WITH DIRECT FLOAT-TO-PEN LINKAGE,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
For primary bibliographic entry see Field 7B.
W75-03099

DETERMINE STREAMFLOWS FROM GEOMORPHIC PARAMETERS,
Washington State Univ., Pullman. Dept. of Civil and Environmental Engineering.
J. F. Orsborn.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 100, No IR4, Proceedings Paper 10986, p 455-457, December 1974. 15 fig, 3 tab, 38 ref, 2 append.

Descriptors: *Streamflow, *Geomorphology, *Basins, *Drainage density, *Hydrology, *Regression analysis, Alluvial channels, Antecedent moisture content, Rainfall-runoff relationships, Drainage area, Methodology, Flood frequency, *Pacific Northwest US, Low flow, Floods.

Hydrologists and geomorphologists have sought to relate streamflows to geomorphic parameters such as stream length; length, perimeter relief, width, and area of the basin; drainage density; and channel slope. Data continuity problems for such analyses were addressed by statistical manipulations and extensions of data. The application of dimensional analysis to fluvially eroded landforms by Strahler in 1958 provided a strong link between geomorphic, hydraulic, and hydrologic principles. Mention was made of the relative mapscale effect in determination of various basin parameters. An overview of some hydrologic-geomorphic streamflow analysis studies was presented and a few new methods were explored. With these methods correlations of precipitation and streamflow records, in combination with geomorphic parameters determined from maps, were used to analyze gaged and ungaged streamflows. Some of the methods have been developed, tested, and proved in the Pacific Northwest for both low and flood flows. (Singh-ISWS)
W75-03103

HYDROLOGY OF 7-DAY 10-YR LOW FLOWS,
Illinois State Water Survey, Urbana. Hydrology Section.
For primary bibliographic entry see Field 5B.
W75-03104

ON THE THEORY OF WATER WAVES,
California Univ., Berkeley. Dept. of Mechanical Engineering.
A. E. Green, N. Laws, and P. M. Naghdi.
Available from the National Technical Information Service, Springfield, Va 22161, as AD-779 329, $3.75 in paper copy, $2.25 in microfiche. Report No AM-74-1, February 1974. 25 p, 9 ref. NR 064-436. ONR Contract N00014-69-A-0200-1008.

Descriptors: *Waves(Water), *Gravity waves, *Theoretical analysis, Analysis, Equations, Mathematics, Continuity equation, Momentum equation, Wavelengths, Hydraulics.
Identifiers: *Non-linear theory, *Solitary waves, Inviscid fluid, Cosserat surface, Incompressible fluid, Two-dimensional theory.

A two-dimensional theory for the propogation of fairly long water waves was formulated directly from a set of two-dimensional postulates. A simple three-dimensional approximation was shown to relate the two-dimensional theory to the three-dimensional theory. The resulting equations were used to discuss the unidirectional propogation of waves. The results of this theory were also related to the theories proposed by Korteweg and de Vries and by Benjamin, Bona, and Mahony. (Adams-ISWS)
W75-03108

CHARACTERISTICS OF STREAMFLOW AND GROUNDWATER CONDITIONS IN THE BOISE RIVER VALLEY, IDAHO,
Geological Survey, Boise, Idaho.
C. A. Thomas, and N. P. Dion.
Water-Resources Investigations 38-74, December 1974. 56 p, 21 fig, 3 tab, 12 ref, 2 append.

Descriptors: *Streamflow, *Surface-groundwater relationships, *Idaho, Reservoirs, Water quality, Return flow, Duration curves, Water yield, Groundwater.
Identifiers: *Boise River Valley(Idaho), Snake River(Idaho), Lucky Peak Lake(Idaho).

The quantity, quality, and distribution in time of streamflow in Boise River, Idaho, below Lucky Peak Lake are drastically affected by storage reservoirs, diversions for irrigation, and by domestic, industrial, and agricultural wastes. Reservoirs usually fill during the nonirrigation season, and streamflow for several miles below Lucky Peak Lake is very low, sometimes less than 10 cfs. On November 18-19, 1971, when the gates at Lucky Peak Dam were closed, inflow to the Boise River in the study reach totaled 1010 cfs. Practically all inflow was discharged groundwater. During the growing season, several thousands of cfs are released from Lucky Peak Lake, but diversions reduce the flows to near zero below some large diversion points in the study reach. Characteristics of streamflow are described by duration curves, duration hydrographs, and low-flow and high-flow frequency curves. Water released from Lucky Peak Lake is of excellent quality. Dissolved solids are usually less than 80 milligrams per liter. Discharged groundwater increases the dissolved solids in the river downstream to 400 milligrams per liter or more when dilution from Lucky Peak Lake is slight. Other measures of water quality likewise show the deterioration in a downstream direction in the study reach. (Knapp-USGS)
W75-03151

FLOODS IN IOWA: A COMPARATIVE STUDY OF REGIONAL FLOOD FREQUENCY METHODS,
Geological Survey, Iowa City, Iowa.
O. G. Lara.
Iowa Natural Resources Council, Des Moines, Bulletin No 12, December 1974. 63 p, 10 fig, 11 tab, 18 ref.

Descriptors: *Floods, *Iowa, *Statistical methods, *Flood frequency, Flood recurrence interval, Flood forecasting, Statistics.

Four regional flood frequency methods were applied to flood data collected at 131 gaging stations in Iowa to appraise the reliability of each method. The methods selected for this study are T-year magnitude, regionalization of the log-Pearson type III distribution parameters, regionalization of the log-normal distribution parameters, and index-flood magnitude. The T-year magnitude method and the regionalization of the log-Pearson type III parameters are equally reliable and yield the most acceptable results. They both can be applied to ungaged areas with equal confidence, and the sample from which the estimating equations are derived is adequate. The use of the log-Pearson type III distribution parameters implies that floods in Iowa conform to a fixed distribution. To avoid this commitment, it is advisable that the T-year magnitude method be adopted. A significant percentage of the results from the regionalization of the log-normal parameters was overestimated. A significant percentage of the results from using the Index-flood magnitudes was under-estimated. The regionalization of the log-normal parameters and the Index-flood magnitude method were found unacceptable. (Knapp-USGS)
W75-03161

FLOOD-VOLUME DATA FOR IOWA STREAMS,
Geological Survey, Iowa City, Iowa.
For primary bibliographic entry see Field 7C.
W75-03162

HYDROLOGIC AND GEOPHYSICAL DATA FROM THE PICEANCE BASIN, COLORADO,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 7C.
W75-03165

HYDROLOGIC UNIT MAP--1974, STATE OF MAINE.
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-03166

HYDROLOGIC UNIT MAP--1974, STATE OF NEW JERSEY.
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-03167

HYDROLOGIC UNIT MAP--1974, STATES OF MARYLAND AND DELAWARE.
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-03168

HYDROLOGIC UNIT MAP--1974, STATES OF MASSACHUSETTS, RHODE ISLAND AND CONNECTICUT.
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-03169

HYDROLOGIC UNIT MAP--1974, STATES OF NEW HAMPSHIRE AND VERMONT.
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-03170

ON THE STATISTICAL PROPERTIES OF WAVE FORCE,
North Carolina State Univ., Raleigh. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W75-03182

APPLIED MATHEMATICAL MODELING OF THE OXYGEN DISTRIBUTION IN A MISSISSIPPI STREAM,
Mississippi State Univ., State College.
For primary bibliographic entry see Field 5B.
W75-03184

TRANSIENT TWO-DIMENSIONAL HEAT CONDUCTION PROBLEMS SOLVED BY THE FINITE ELEMENT METHOD,
California Univ., Santa Barbara. Dept. of Mechanical Engineering.
J. C. Bruch, Jr., and G. Zyvoloski.
International Journal for Numerical Methods in Engineering, Vol 8, 1974. pp 481-494, 2 fig, 12 tab, 14 ref. (California Water Resources Center Project UCAL-WRC-W-336). OWRT A-039-CAL(7).

Descriptors: *Finite element analysis, *Thermal conductivity, Computer programs, *Flow, *Mathematical analysis.

A finite element weighted residual process has been used to solve transient linear and non-linear two-demensional heat conduction problems. Rectangular prisms in a space-time domain were used as the finite elements. The weighting function was equal to the shape function defining the dependent variable approximation. The results are compared in tables with analytical, as well as other numerical data. The finite element method compared favourably with these results. It was found to be stable, convergent to the exact solution, easily programmed, and computationally fast. Finally, the method does not require constant parameters over the entire solution domain. (Snyder-California-Davis)
W75-03271

AN APPLICATION OF LEAST SQUARES TO ONE-DIMENSIONAL TRANSIENT PROBLEMS,
California Univ., Santa Barbara. Dept. of Mechanical Engineering.
R. W. Lewis, and J. C. Bruch, Jr.
International Journal for Numerical Methods in Engineering, Vol 8, 1974. p 633-647, 8 tab, 5 ref. (Calif. Water Resources Center Project UCAL-WRC-W-336). OWRT-A-039-CAL(8).

Descriptors: *Least squares method, *Finite element analysis, *Mathematical analysis, *Flow, *Algorithms, Equations, Unsaturated flow, Diffusion, Thermal conductivity.

The method of 'least squares', which falls under the category of weighted residual processes, is applied as a time-stepping algorithm to one-dimensional transient problems including the heat conduction equation, diffusion-convection equation, and a non-linear unsaturated flow equation. Comparison is made with other time-stepping algorithms, and the least squares method is seen to offer definite advantages. (Snyder-California-Davis)
W75-03272

2F. Groundwater

WATER FOR INDUSTRIAL DEVELOPMENT IN BENTON, LAFAYETTE, MARSHALL, PONTOTOC, TIPPAH, AND UNION COUNTIES, MISSISSIPPI,
Geological Survey, Jackson, Miss.
For primary bibliographic entry see Field 2E.
W75-02814

RECORDS OF PRECIPITATION, WATER LEVELS, AND GROUND-WATER RECHARGE TO THE EDWARDS AND ASSOCIATED LIMESTONES, SAN ANTONIO AREA, TEXAS, 1972-73,
Geological Survey, San Antonio, Tex.
C. Puente.
Edwards Underground Water District Bulletin 33, November 1974. 12 p, 4 tab, 16 ref.

Descriptors: *Basic data collections, *Groundwater, *Hydrologic data, *Texas, *Water levels, Recharge, Precipitation(Atmospheric), Rainfall, Water balance, Hydrologic budget.
Identifiers: Edwards Limestone(Tex), *San Antonio(Tex).

Records of precipitation, water levels, and estimates of recharge to the Edwards and associated limestones in the San Antonio area of Texas during 1972-73 are summarized. Rainfall for 1972 was near average at most of the stations in the San Antonio area. During 1973, a new annual rainfall record of 52.28 inches was recorded at the San Antonio station, and rainfall was well above average at selected stations throughout the area. Groundwater storage in the Edwards and associated limestones was well above average during 1972-73. Recharge in 1972 and 1973 was in excess of the average annual recharge. During 1973, the recharge was in excess of the average annual recharge by nearly 955,000 acre-feet, or about 180% of the annual average. (Knapp-USGS)
W75-02818

MAJOR AQUIFERS IN MCPHERSON, EDMUNDS, AND FAULK COUNTIES, SOUTH DAKOTA,
Geological Survey, Huron, S Dak.
L. J. Hamilton.
South Dakota Geological Survey Information Pamphlet No 8, 1974. 9 p, 3 fig, 3 plate, 1 tab, append.

Descriptors: *Aquifers, *Groundwater, *South Dakota, Glacial drift, Aquifer characteristics, Hydrogeology, Water quality, Water chemistry, Water properties, *Glacial aquifers, Sand aquifers.
Identifiers: *McPherson County(SD), *Edmunds County(SD), *Faulk County(SD).

Deep glacial aquifers, sand and gravel deposits more than 100 feet deep, underlie an area of about 500 square miles in McPherson, Edmunds, and Faulk Counties in north-central South Dakota. The maximum yield of a large-capacity well can range from 200 to nearly 1,000 gpm for these aquifers. The water has an average hardness of 220 mg/liter and is dominated by sodium, chloride, and bicarbonate ions. Shallow glacial aquifers whose tops are less than 100 feet below land surface underlie a 370-square-mile area. The maximum yield for a large-capacity well can range from 50 to 300 gpm for these aquifers. The water has an average hardness of 400 mg/liter and is dominated by calcium, magnesium, bicarbonate, and sulfate ions. Sandstone aquifers, lying more than 1,000 feet beneath the entire area, are capable of supplying wells yielding as much as 500 gpm or more. Wells in the Dakota Sandstone yield high-sodium water having an average hardness of 100 mg/liter. The deeper Fall River, Sundance, and Minnelusa Formations have artesian pressures as high as 175 pounds per square inch and flows reported to exceed 1,000 gpm at several places. They yield a water high in calcium, magnesium, and sulfate and having an average hardness of 1,000 mg/liter. (Knapp-USGS)
W75-02820

HYDROCHEMICAL INVESTIGATIONS OF THE CENTRAL KENTUCKY KARST AQUIFER SYSTEM,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 3B.
W75-02891

STRATIGRAPHIC IDENTIFICATION AND CORRELATION OF BASALT AQUIFERS USING GEOPHYSICAL AND CHEMICAL TECHNIQUES,
Washington State Univ., Pullman. Coll. of Engineering Research Div.
B. A. Siems.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-238 373, $5.25 in paper copy, $2.25 in microfiche. Office of Water Research and Technology 7/1/73-6/30/74. Research Report No 74/15-90. Washington Water Research Center, July 1974. 56 p, 19 fig, 3 tab, 6 maps, 14 ref, 2 append. OWRT A-065-WASH(1). 14-31-0001-4048.

Descriptors: *Columbia River, Basalts, *Aquifers, *Stratigraphy, Logging(Recording), Geophysics, *Washington, Water wells.
Identifiers: *Basalt aquifers.

Since 1967 the Geohydrology Section of Washington State University has been collecting geophysical data from wells penetrating the upper part of the Columbia River Basalt in Washington. Beginning about 1971, enough data became available so that correlations between wells could be attempted. Using geophysical data, Crosby and Anderson (1971) made stratigraphic correlations and identified the major aquifers in wells in the vicinity of Pullman, Washington. Later work discussed relationships noted between geophysical logs and stratigraphic units in the basalt in other areas. The current report describes the results of the most recent efforts to relate stratigraphic units to the physical features reflected on the logs. Much of this work is preliminary and should be regarded as such. There are two areas discussed: an area in Walla Walla valley, and a large area approximately included by lines connecting Davenport, Cheney, Colfax, Ritzville, Lind, Washtucna, Kahlotus, Othello, Moses Lake, and Almira. The latter area will be referred to as the Odessa area.
W75-02896

CRITICAL STATE OF SALT-WATER UPCONING BENEATH ARTESIAN DISCHARGE WELLS,
Birmingham Univ. (England). Dept. of Civil Engineering.
T. D. Streltsova, and A-A. I. Kashef.
Water Resource Bulletin, Vol 10, No 5, p 995-1008, October 1974. 4 fig, 1 tab, 10 ref. OWRT C-4061(No 9013)(1). 14-31-0001-9013.

Descriptors: *Artesian wells, *Saline water intrusion, *Artesian aquifers, Digital computers, Wells, Drawdown, Potentiometric level, Free surface, Tidal effects, Diffusion, Hydraulic conductivity, Estuaries, Transmissivity, Storage coefficient, Coasts, Aquifers, Networks, Finite element analysis, Resistance.
Identifiers: *Salt water upconing, Gravity wells.

A proposed method for solving gravity well problems and the analogous salt-water upconing problems was presented. The approach allows for the consideration of the vertical flow components which are neglected in many other approaches. A finite-difference form was developed and can simply be solved by digital computers or any kind of experimental analogue techniques. It was demonstrated that in the latter case only two resistance lines were needed to determine the heights of the free surface and the base pressure heads. Critical conditions of upconing were studied. One example was given to check the proposed method against the relaxation technique in determining the free surface in gravity wells that was analogous to the upconing boundaries. The comparison indicated that the proposed method was quite accurate, yet simpler than other complex techniques. The method is currently being expanded to solve more complex problems including the effect of natural flow in the aquifer when the initial piezometric surface is no longer horizontal. (Schicht-ISWS)
W75-02900

ON SEAWATER ENCROACHMENT IN COASTAL AQUIFERS,
State Univ. of New York, Buffalo. Faculty of Engineering and Applied Sciences.
For primary bibliographic entry see Field 2L.
W75-02901

THE HYDRO-MECHANICS OF THE GROUND WATER SYSTEM IN THE SOUTHERN PORTION OF THE KAIBAB PLATEAU, ARIZONA,
Arizona Univ., Tucson.
P. W. Huntoon.
Available from University Microfilms, Ann Arbor, Michigan, No 70-22, 111. PhD Dissertation, 1970. 251 p, 55 fig, 9 tab.

Descriptors: Paleozoic, Fractures, *Faults(Geologic), *Groundwater, Conduits, Drains, Floodways, Karst, *Karst hydrology, Permeability, Subsurface drainage, *Arizona.
Identifiers: Kaibab plateau(Ariz), Fault zones, Fault controlled drainage networks, Exploration drilling.

The elevated Kaibab plateau in northern Arizona has an area of 880 square miles and lies adjacent to the Grand Canyon of the Colorado river. It is composed of a sequence of lithified Paleozoic rocks that are approximately 4000 feet thick and consist of marine sediments that contain very little permeability. The ground water system of the plateau has two principal components: (1) circulation through unfractured stratified rocks that range up to a few tens of miles wide and (2) fault controlled drains. Development of ground water supplies does not appear to be economically tenable in the unfractured portions of the plateau because the permeabilities of the rocks are very small; the depth to the small quantities of available water exceeds 500 feet. Production from the large fault controlled drainage networks is equally unattractive. Although the occurrence of water is certain, the large supplies are more than 2800 feet below the land surface and exist in finite channels along the fault zones. These could be difficult to penetrate with conventional drilling methods. (Campbell-NWWA)
W75-02993

INTERBASIN GROUND-WATER FLOW IN SOUTHERN NEVADA,
Mackay School of Mines, Reno, Nev.
R. L. Naff, G. B. Maxey, and R. F. Kaufmann.
Nevada Bureau of Mines and Geology, Reno, Report No 20, 1974. 28 p, 10 fig, 1 tab, 54 ref, 1 append.

Descriptors: *Groundwater basins, *Inter-basin transfers, *Water quality, *Groundwater movement, *Geologic mapping, *Nevada, Structural geology, Transfer, Water transfer, Subsurface waters, Aquifers, Geohydrologic units, Percolating water, Areal hydrogeology, Geologic investigations, Groundwater, Deserts, California.
Identifiers: Piper diagrams, Trilinear diagrams, *Amargosa Desert(Nev).

A guidebook to the hydrogeology of the southern Amargosa Desert and adjacent areas in southern Nye County, Nevada and nearby California was given. Flow systems for Las Vegas and Pahrump Valleys and the Amargosa Desert and Nevada Test Site was described and compared. Focus was on the effects of interbasin flow on quality and quantity of water discharged in the Ash Meadows area. (Prickett-ISWS)
W75-03096

RADIAL DISPERSION IN GROUND-WATER FLOW,
Canterbury Univ., Christchurch (New Zealand). Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-03100

PERMEABILITY OF COHESIONLESS SOILS,
Libya Univ., Tripoli. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2G.
W75-03101

V 8 6 M R 1 5 7 5 UMI

CHARACTERISTICS OF STREAMFLOW AND GROUNDWATER CONDITIONS IN THE BOISE RIVER VALLEY, IDAHO,
Geological Survey, Boise, Idaho.
For primary bibliographic entry see Field 2E.
W75-03151

MATHEMATICAL MODEL OF THE SAN JUAN VALLEY GROUND-WATER BASIN, SAN BENITO COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 4B.
W75-03153

SEAWATER INTRUSION, GROUND-WATER PUMPAGE, GROUND-WATER YIELD, AND ARTIFICIAL RECHARGE OF THE PAJARO VALLEY AREA, SANTA CRUZ AND MONTEREY COUNTIES, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 5B.
W75-03154

A PROGRESS REPORT ON RESULTS OF TEST-DRILLING AND GROUND-WATER INVESTIGATIONS OF THE SNAKE PLAIN AQUIFER, SOUTHEASTERN IDAHO: PART 3. LAKE WALCOTT-BONANZA LAKE AREA,
Geological Survey, Boise, Idaho.
For primary bibliographic entry see Field 4B.
W75-03155

DEPTH TO BEDROCK IN WISCONSIN,
Geological Survey, Madison, Wis.
For primary bibliographic entry see Field 7C.
W75-03156

FLUCTUATIONS OF THE WATER TABLE IN LEE COUNTY, FLORIDA, 1969-1973,
Geological Survey, Tallahassee, Fla.
T. M. Missimer, and D. H. Boggess.
Open-file report FL 74019, 1974. 41 p, 16 fig, 4 tab, 3 ref.

Descriptors: *Groundwater, *Florida, *Water table, *Water level fluctuations, Water levels, Drainage, Withdrawal, Recharge, Urbanization.
Identifiers: *Lee County(Fla).

The water table in Lee County, Florida, Generally ranges from near land surface to about 4 feet below land surface in June-October when recharge from rainfall is maximum. When recharge is limited by a deficiency of rainfall, the water table may range from 3 to 10 feet below the land surface. Because of the nearness of the water table to land surface particularly during the wet season, extensive drainage networks have been constructed to make the land suitable for urban development. (Knapp-USGS)
W75-03164

HYDROLOGIC AND GEOPHYSICAL DATA FROM THE PICEANCE BASIN, COLORADO,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 7C.
W75-03165

COMBINING GEOELECTRICAL AND DRILL HOLE INVESTIGATIONS FOR DETECTING FRESH WATER AQUIFERS IN NORTHWESTERN MISSOURI,
Missouri Univ., Rolla.
For primary bibliographic entry see Field 4B.
W75-03234

2G. Water In Soils

INFILTRATION OF CONSTANT-FLUX RAINFALL INTO SOIL AS ANALYZED BY THE APPROACH OF GREEN AND AMPT,
Purdue Univ., Lafayette, Ind.
D. Swartzendruber.
Soil Sci, Vol 117, No 5, p 272-281, 1974, Illus.
Identifiers: Flow, *Infiltration, Mathematical formulae, Rainfall, *Soil profiles, *Water flux, *Equations.

Infiltration of water into soil from an application of constant water flux r is analyzed theoretically by treating the resulting soil-water profiles as step functions, is assumed in the approach of Green and Ampt (1911). Important features of the infiltration process then follow in fairly straightforward mathematical form. As r decreases toward the near-saturated soil hydraulic conductivity K sub b, the time t sub o of onset of surface-water excess is sufficiently increased so that the curves of infiltration flux i versus cumulative time t are shifted toward larger times, progressively away from the curve of i versus t for continuous ponding. But i is not a simple function of t, primarily because the cumulative water infiltration I is an implicit function of t. Two explicit-form equations are then proposed for i versus t, both equations being integrable into explicit forms of I versus t. The i explicit equation is matched with the implicit function within plus or minus 11%, over the whole range from r = K sub b to r - alpha at continuous ponding. The other explicit equation is more suitable for r nearer to K sub b, the error of matching to the implicit function being within plus or minus 5 percent for $1 < r/K \text{ sub } b < 10$. Thus, both explicit equations appear to have promise for expressing infiltration phenomena (flux and cumulative) as a function of time.--Copyright 1974, Biological Abstracts, Inc.
W75-02795

SOIL WATER PROFILE DEVELOPMENT UNDER A PERIODIC BOUNDARY CONDITION,
Colorado State Univ., Fort Collins.
A. Klute, and D. F. Heermann.
Soil Sci, Vol 117, No 5, p 265-271, 1974, Illus.
Identifiers: *Boundary conditions, Equations, *Hysteresis, Pressure, Soils, *Soil water, Numerical analysis, *Soil profiles, Richards equation.

A numerical solution technique was applied to the Richards equation for soil-water flow. Hysteresis in the water-content--pressure-head relation was incorporated into the solution procedure. Water content, pressure head and flux time and depth distributions were calculated for a column of sand subjected to a periodic upper boundary condition. Two cases were examined: (1) an initially dry, deep (semiinfinite) sand column and (2) a sand column with a water table at a depth of 300 cm. In both cases the waveforms of water content, pressure head, and flux exhibited a progressive increase in phase lag and decrease of amplitude with depth. The highly nonlinear soil-water flow system introduced a high degree of harmonic distortion into the response of the system to a sinusoidal boundary condition.--Copyright 1974, Biological Abstracts, Inc.
W75-02802

A LABORATORY STUDY OF INFILTRATION-ADVANCE,
Sydney Univ. (Australia). Dept. of Soil Science.
N. Collis-George.
Soil Sci Vol 117, No 5, p 282-287. 1974, Illus.
Identifiers: *Infiltration, Laboratory studies, *Water movement, Flumes, *Equations, Hydraulic conductivity, Mathematical transformations.

A laboratory flume with transparent walls was used to observe simultaneously movement of the advancing front over the ground surface and depth of penetration of the wetting front. The experimental data were used to test Laplace transformations of the Lewis and Milne infiltration-advance equation involving: (1) a short-term infiltration equation y = S square root t + At (Philip); and (2) a long-term steadystate infiltration equation y = yo + Kt. (K is the hydraulic conductivity of the transmission zone, yo is a constant, S is the sorptivity, and A the appropriate hydraulic conductivity during the nonsteady infiltration period). It is concluded that tc, defined as S square root tc = yo and which can be determined either independently or from the flume results, is a convenient soil parameter to determine the appropriate 'advance-infiltration' equation. The transformation involving equation (2) was accurate to within 10% at all times greater than 1/2tc for 3 materials. The transformation involving equation (1) was accurate to within 5% only up to times less than tc.--Copyright 1974, Biological Abstracts, Inc.
W75-02826

THE USE OF A NON-DISPERSIVE ATOMIC FLUORESCENCE SPECTROMETER FOR THE DETERMINATION OF ZINC IN SOILS AND NON-FERROUS METAL ALLOYS,
Imperial Coll. of Science and Technology, London (England). Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-02827

A HELE-SHAW MODEL STUDY OF OSCILLATING WATER TABLES IN DRAINED HOMOGENEOUS SOILS,
Alexandria Univ. (Egypt). Dept. of Soil and Water Science.
S. M. Marei.
Soil Sci, Vol 117, No 5, p 301-305, 1974, Illus.
Identifiers: *Hele-Shaw model, *Mathematical models, *Soils, *Water table, Drainage.

Water-table heights in a drained soil under seasonally fluctuating irrigation intensities were investigated experimentally by means of a Hele-Shaw model and were compared with the theoretical harmonic predictions of E.C. Childs. Good agreement was found between theory and experiment in the values of mean water-table heights and their amplitudes of oscillation. The oscillation was found to deviate from the simple harmonic form predicted by the theory for short time periods. The deviation was attributed to limitations in the Hele-Shaw model.--Copyright 1974, Biological Abstracts, Inc.
W75-02856

WATER-TABLE HEIGHTS IN HOMOGENEOUS SOILS DRAINED BY NONIDEAL DRAINS,
Agricultural Research Council, Cambridge (England). Unit of Soil Physics.
E. G. Youngs.
Soil Sci. Vol 117, No 5, p 295-300, 1974. Illus.
Identifiers: Design, *Drainage, *Drains, Formulas, *Soils, *Water table.

The concepts of the equivalent drain radius and entrance resistance of a nonideal drain are used to obtain drainage formulas to describe the relationships between the maximum water-table height and average flux through the water table for parallel drainage installations when there is infinite depth of soil below the drain and when the drain is laid on the impermeable floor. For small equivalent drain radii or large entrance resistances there is little difference in the 2 relationships. Experiments in a hydraulic model sand tank show that the proximity of an impermeable floor has little effect on the equivalent drain radius of a given drain, and that water-table heights are in fair agreement with the theoretical formulas.--Copyright 1974, Biological Abstracts, Inc.
W75-02878

WATER STABILITY TESTS ON CLAY SOILS IN RELATION TO MOLE DRAINING,
Ministry of Agriculture, Fisheries and Food, Trumpington (England). Field Drainage Experiment Unit.
D. W. Rycroft, and A. A. Thorburn.
Soil Sci, Vol 117, No 5, p 306-310, 1974, Illus.
Identifiers: *Clays, *Mole drainage, Soils, *Tests, *Water stability(Soils), *Soil moisture.

Childs' method of using moisture characteristic curves of clay soil aggregates as a test of their water stability was investigated as a means of identifying soils that are suitable for mole draining. The results of the test applied to a soil in which mole drains are known to last many years and to one in which they are known to fail shortly after being drawn, were used to assess the suitability of a 3rd soil, taken from 2 locations a distance of 30 km apart, for mole draining. The tests on a given soil were reproducible on samples collected from different sites over a field except in one case when slaking of the sample during the test resulted in the surface's sealing and an anomolous moisture characteristic curve.--Copyright 1974, Biological Abstracts, Inc.
W75-02909

RECENT PROGRESS IN THE SOLUTION OF NONLINEAR DIFFUSION EQUATIONS,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Environmental Mechanics.
J. R. Philip.
Soil Sci, Vol 117, No 5, p 257-264, 1974.
Identifiers: *Diffusion, *Equations, *Model studies, *Soil swelling, Volume, Water movement.

Important contributions of the late Dr. E. C. Childs included early recognition of the nonlinear diffusion form of the nonhysteretic flow equation for unsaturated nonswelling soils, and of the importance of a predictive system based on the flow equation. The full equation is a nonlinear Fokker-Planck equation, and reduces to a diffusion equation when gravity may be neglected. Equations of the same form describe water movement and volume change in swelling soils. Recent work on quasi-analytical and analytical methods of solving these equations is reviewed. Quasilinear solutions of the steady equation in 2 and 3 dimensions have received much attention. The extension to heterogeneous soils can be taken further to include sloping stratification. Theorems enable solutions for surface sources, and sources at arbitrary finite depth, to be deduced from mathematically simpler solutions in a region extending infinitely in all directions. A generalization to the case of sloping soil surface is given. In many real-world problems where similarity methods do not apply, integral methods offer the same possibility of effectively reducing the number of independent variables. Green and Ampt introduced a simple integral method; and more sophisticated methods have entered soil-water studies through the work of Parlange. Recent studies reveal the importance of preserving integral continuity in integral methods involving iteration. Knight has found the exact Burgers solutions corresponding to constant-concentration infiltration and to constant-flux infiltration. Both solutions yield the same 'profile at infinity' behavior at large times, as one expects on physical grounds. The Burgers model is more informative and more accurate than simple linearization.--Copyright 1974, Biological Abstracts, Inc.
W75-02910

THE HYSTERESIS IN THE RELATIONSHIP BETWEEN HYDRAULIC CONDUCTIVITY AND SUCTION,
Agricultural Research Council, Cambridge (England). Unit of Soil Physics.
A. Poulovassilis, and E. Tzimas.
Soil Sci. Vol 117, No 5, p 250-256, 1974. Illus.
Identifiers: Distribution, Domain concept, *Hydraulic conductivity, *Hysteresis, Soils, *Suction, *Soil moisture.

The hysteretic relationship between hydraulic conductivity and suction is examined in the light of the domain concept. It is argued that the distribution function G of the conductivity elements is strongly dependent on the suction rSd at which the trend of suction reverses from increasing to decreasing irrespective of whether the relationship between pore water and suction conforms to the independent domain concept or not; it also depends strongly on the suction rSw at which the trend of suction reverses from decreasing to increasing when the moisture characteristic shows dependent pore water properties. Thus the hysteretic curves decribing the relationship between hydraulic conductivity and suction fro a porous body with a moisture characteristic conforming to the independent domain concept they may still provide reliable values for the G function for a particular value of the reversal suction rSd since there is not a strong dependence of G on the reversal suction rSw. Experimental relationships between hydraulic conductivity and suction for 3 porous bodies confirm the above conclusions and show the effect of the dependence of the function G on the reversal suctions rSd and rSw.--Copyright 1974, Biological Abstracts, Inc.
W75-02911

EFFECT OF TWO NONIONIC SURFACTANTS ON ADSORPTION AND MOBILITY OF SELECTED PESTICIDES IN A SOIL-SYSTEM,
California Univ., Riverside. Dept. of Soil Sciences and Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W75-02912

INTERACTIONS OF MICROBIAL METABOLISM AND SOIL PHYSICAL PROPERTIES AND THEIR SIGNIFICANCE IN SOME HYDROLOGICAL PROCESSES,
Agricultural Research Service, Baton Rouge, La. Soil and Water Conservation Research Div.
J. F. Parr, and R. I. Papendick.
In: Biological Effects In The Hydrological Cycle, Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana. p 148-162, 2 fig, 2 tab, 38 ref.

Descriptors: *Hydrobiology, *Hydrology, *Soil physical properties, *Microorganisms, *Soil-water-plant relationships, Metabolism, Organic matter, Infiltration, Percolation, Permeability, Soil water, Retention, Soil environment, Available water, Aerobic bacteria, Anaerobic bacteria, Fungi, Chemical reactions, Synthesis, Respiration, Fermentation, Drainage, Field capacity, Wilting point, Osmotic pressure, Pore pressure, Free energy, Humidity, Inhibitors, Oxidation-reduction potential, Solutes.
Identifiers: Waterlogged soils, Water repellency, Chemical dissolution.

The potential energy of water is the additional work required to obtain the water from a system, such as soil, relative to pure, free water. Thermodynamically, the total soil water potential is identical to the partial molar free energy of the soil water relative to free water at some reference elevation and at the same temperature. The difference in the partial molar free energy of the soil water and of free water is a log function of the relative humidity. Generally, with decreasing water potentials, fewer organisms are able to grow and reproduce. Controlling the soil water potential may be a means of controlling the soil ecological system and thereby allowing selective and predictable watershed responses. It is important to consider some inorganic chemical transformations by bacteria in most soils, particularly under poorly drained conditions. Certain of these transformations can adversely affect runoff, infiltration, and permeability. During water-spreading operations for recharging groundwater reservoirs, infiltration rates and permeability frequently decrease with time due to biological clogging with microbial cells and their synthesized products. A number of common soil fungi can synthesize compounds that produce water repellency, thereby reducing the infiltration rate and permeability of such soils. (See also W75-03023) (Visocky-ISWS)
W75-03031

APPLICABILITY OF THE GREEN-AMPT APPROACH TO WATER INFILTRATION THROUGH SURFACE CRUST,
Hawaii Univ., Honolulu. Dept. of Agronomy and Soil Science.
L. R. Ahuja.
Soil Science, Vol 118, No 5, p 283-288, November 1974. 3 fig, 7 ref. AID 211(d).

Descriptors: *Infiltration, *Soil surfaces, *Topsoil, *Flow resistance, Numerical analysis, Equations, Seepage, Soil amendments, Soil properties, Recharge, Compacted soils, Soil pressure, Moisture, Soil compaction, Infiltration rates, Steady flow, Unsteady flow.
Identifiers: *Green-Ampt approach, *Yolo soil, Surface crust.

Applicability of the Green-Ampt approach to describe water infiltration through surface crust after the rapid initial stage was evaluated by testing the equations of Hillel and Gardner and two modifications of these against numerical-solution data for Yolo soil. The modifications were designed to approximately account for the transient nature of soil-water content at the crust-soil boundary. One of the modifications involved piecewise application of Hillel and Gardner's equations, and the other treated the boundary water content as a continuous variable. The results of tests showed that the unmodified equations of Hillel and Gardner were fairly good for a smaller crust resistance but involved considerable error for a larger resistance. Piecewise application of these equations with as small as four subranges gave results in close agreement with the numerical solution for both resistances. The other modifications involving continuously variable boundary water content showed very good agreement for both resistances in early stages. In the intermediate stages, it showed errors of large relative magnitude, which decreased with increase in resistance. (Prickett-ISWS)
W75-03093

MODELING EVAPOTRANSPIRATION AND SOIL MOISTURE,
Agricultural Research Service, Columbia, Mo.
For primary bibliographic entry see Field 2D.
W75-03097

PERMEABILITY OF COHESIONLESS SOILS,
Libya Univ., Tripoli. Dept. of Civil Engineering.
A. M. Amer, and A. A. Awad.
Journal of the Geotechnical Engineering Division, American Society of Civil Engineers, Vol 100, No GT12, p 1309-1316, December 1974. 4 fig, 1 tab, 8 ref, 2 append.

Descriptors: *Permeability, *Hydraulic conductivity, *Particle size, *Cohesionless soils, Particle shape, Uniformity coefficient, Void ratio, Soil properties, Porous media, Porosity, Sands, Soils, Darcys law, Permeameters, Groundwater, Least squares method, Regression analysis, Equations.
Identifiers: *Effective grain diameter, Tortuosity, Mean grain diameter.

The permeability coefficient, k, of a porous matrix in Darcy's equation of hydraulic conductivity, K=k (gamma/mu), depends mainly on the properties of the solid matrix, e.g., porosity, tortuosity, size distribution, and grain shape. Various formulas describing the relationship between k and these properties show k to be a function of a shape factor, a porosity factor, and the square of the mean grain diameter. The dependence of hydraulic conductivity on the uniformity coefficient, U, effec-

tive grain diameter, D sub 10, and void ratio, e, was emphasized. The factor, alpha, which includes the shape effect, is related to the effective diameter raised to the 0.32 power and is found to be independent of void ratio for cohesionless soils. An empirical equation was determined which shows K to have a power relationship to D sub 10, U, and e. It was recommended that this equation be applied for determining permeability for cohesionless soils. An expression for tortuosity was also obtained in terms of powers of U and D sub 10. (Visocky-ISWS)
W75-03101

EFFECT OF SNOW COVER ON UPWARD MOVEMENT OF SOIL MOISTURE,
National Weather Service, Silver Spring, Md. Hydrologic Research and Development Lab.
E. L. Peck.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 100, No IR4, Proceedings Paper 10989, p 405-412, December 1974. 2 fig, 15 ref, 1 append.

Descriptors: *Soil moisture, *Snow cover, *Snowmelt, *Frozen soils, Thawing, Runoff, Drainage, Floods, Hydrology, Rivers, Soil temperature, Winter, Frost, Rainfall, Field capacity, Vapor pressure, Model studies, Snow surveys, *Minnesota.
Identifiers: *Rock River basin(Minn).

The soil moisture in the ground beneath a snow cover in the north central United States was observed to increase during the winter season. The maximum prethaw soil moisture frequently is observed immediately prior to the onset of the spring melt. A primary mechanism producing the increase is the upward movement of moisture in both liquid and vapor phase that may occur with or without the presence of frozen conditions when induced by a temperature gradient. The importance of this phenomenon in relation to forecasting the snowmelt runoff during the critical spring period was examined. (Visocky-ISWS)
W75-03106

EXPLORATORY FIELD STUDY OF A GROUND WASTE DISPOSAL FACILITY,
Hanford Atomic Products Operation, Richland, Wash.
For primary bibliographic entry see Field 5B.
W75-03117

A MATHEMATICAL SIMULATION MODEL FOR THE MOVEMENT OF WATER AND NITRATE IN THE SOIL PROFILE,
Illinois Univ., Urbana. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W75-03119

SIMPLE SOIL WATER SIMULATION MODEL FOR ASSESSING THE IRRIGATION REQUIREMENTS OF CITRUS,
Volcani Inst. of Agricultural Research, Bet-Dagan (Israel). Div. of Agricultural Meteorology.
For primary bibliographic entry see Field 3F.
W75-03228

A STUDY OF THE UNIQUENESS OF THE SOIL MOISTURE CHARACTERISTIC DURING DESORPTION BY VERTICAL DRAINAGE,
Grenoble Univ. (France). Laboratories de Mecanique des
G. Vachaud, M. Vauclin, and M. Wakil.
Soil Science Society of America Proceedings, Vol 36, No 3, p 531-532, May-June, 1972. 2 fig, 6 ref.

Descriptors: *Soil water, *Drainage, Transition flow, Tensiometers, *Soil moisture.

Previous experiments concerning the desorption of a horizontal column of uniform soil suggested that the moisture characteristic was not unique throught the column. Further desorption experiments have been carried out on a vertical column. The results are consistent with those obtained previously. (Skogerboe-Colorado State)
W75-03231

TRANSIENT TWO-DIMENSIONAL HEAT CONDUCTION PROBLEMS SOLVED BY THE FINITE ELEMENT METHOD,
California Univ., Santa Barbara. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 2E.
W75-03271

AN APPLICATION OF LEAST SQUARES TO ONE-DIMENSIONAL TRANSIENT PROBLEMS,
California Univ., Santa Barbara. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 2E.
W75-03272

STUDIES ON MOISTURE STATUS OF FOREST SOILS: A PROPOSITION OF A CERAMIC BLOCK APPARATUS FOR LONG-TERM SOIL MOISTURE MEASUREMENT IN THE FIELD AND SOME RESULTS, (IN JAPANESE),
Government Forest Experiment Station, Kansai (Japan). Lab. for Soil Science.
J. Yoshioka.
Bull Gov For Exp Stn (Tokyo). 250 p 35-52, 1973. Illus. English summary.
Identifiers: *Apparatus(Ceramic block), *Forest soils, *Measurement, Moisture, *Soil moisture, Soils.

A ceramic block apparatus is described for soil water measurement. Devices were tested over 24 mo.; it was determined that a large (72 cm3) device gave better performance under extremely dry conditions that a 32 cm3 one. Soil water tension less than pF 2.9 can be monitored with the device.--Copyright 1974, Biological Abstracts, Inc.
W75-03285

TWO CLASSROOM EXERCISES DEMONSTRATING THE PATTERN OF CONTAINER SOIL WATER DISTRIBUTION,
Illinois Univ., Urbana.
L. A. Spomer.
Hortscience Vol 9, No 2, p 152-153, 1974. Illus.
Identifiers: *Distribution patterns, *Soil water training, Education, *Container soil, Horticulture.

The soil water distribution pattern in a container soil is simulated using cellulose sponges as an analog of container soils. Two classroom exercises are presented that have been successful in both classroom and extension presentations to horticulturists.--Copyright 1974, Biological Abstracts, Inc.
W75-03286

INFLUENCE OF PEAT MOSS ON SOIL WATER RETENTION FOR PLANTS,
Department of Agriculture, Summerland (British Columbia). Research Station.
For primary bibliographic entry see Field 2I.
W75-03287

2H. Lakes

EUTROPHICATION PROBLEMS IN THE ST. LAWRENCE GREAT LAKES,
Wisconsin Univ., Milwaukee. Center for Great Lakes Studies.
For primary bibliographic entry see Field 5C.
W75-02754

PROBLEMS OF GREAT LAKES SHORE EROSION,
Wisconsin Univ., Milwaukee. Dept. of Mechanics.
For primary bibliographic entry see Field 4D.
W75-02755

WASTE WATER EFFECTS ON A LARGE BODY OF WATER,
Vsesoyusnyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
For primary bibliographic entry see Field 5B.
W75-02757

WATER RESOURCES RESEARCH POLICIES FOR THE GREAT LAKES,
Great Lakes Basin Commission, Ann Arbor, Michigan.
For primary bibliographic entry see Field 6E.
W75-02770

CONCEPTS OF WATERSHED MANAGEMENT: THE SODIUM BUDGETS OF LAKE CHAMPLAIN,
Vermont Univ., Burlington. Lake Champlain Studies Center.
For primary bibliographic entry see Field 5B.
W75-02788

LAKE ERIE BOTTOM TRAWL EXPLORATIONS, 1962-66,
Bureau of Commercial Fisheries, Ann Arbor, Mich. Exploratory Fishing and Gear Research Base.
E. W. Bowman.
NOAA Technical Report National Marine Fisheries Service Special Scientific Report-Fisheries 674, January 1974. 21 p, 9 fig, 1 tab, 7 ref, 1 append.

Descriptors: *Lake Erie, *Fish harvest, *Trawling, *Exploration, Commercial fish, Fishing, Yellow perch, Marine fish, Drums, Freshwater fish, Carp, Channel catfish, White bass.
Identifiers: Research Vessel Kaho, Rainbow smelt, Alewife.

The abundance, availability to the otter (bottom) trawl, and depth distribution of various Lake Erie fish stocks were surveyed between April 1962 and October 1966. The four exploratory cruises, conducted aboard the research vessel Kaho, clearly demonstrated the effectiveness of the bottom trawl in producing commercial quantities of yellow perch, Perca flavescens, and rainbow smelt, Osmerus mordax. Freshwater drum, Aplodinotus grunniens; carp, Cyprinus carpio; channel catfish, Ictalurus punctatus; and white bass, Roccus chrysops, were all produced in commercial quantities at least once during the study and collectively accounted for 17.1% of the total landings. Between the first exploratory cruise in 1962 and the last in 1966 the abundance of yellow perch decreased significantly, and that of alewife, Alosa pseudoharengus, increased dramatically. With few exceptions, the bottoms of all U.S. waters of the three basins of Lake Erie were suitable for bottom trawling. (Humphreys-ISWS)
W75-02804

COMBINED CONDUCTION-RADIATION ENERGY TRANSFER IN STAGNANT WATER,
Purdue Univ., Lafayette, Ind. Heart Transfer Lab.
For primary bibliographic entry see Field 5B.
W75-02902

KINETICS OF PHOSPHATE ADSORPTION AND DESORPTION BY LAKE SEDIMENTS,
Maine Univ., Orono. Dept. of Plant and Soil Sciences.
For primary bibliographic entry see Field 5C.
W75-02904

CHEMICAL AND PHYSICAL CHARACTERISTICS OF A EUTROPHIC RESERVOIR AND ITS TRIBUTARIES: LONG LAKE, WASHINGTON,
Eastern Washington State Coll., Cheney. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W75-02905

VERTICAL DISTRIBUTION OF THE BACTERIOPLANKTON AND THE THERMAL-OXYGEN RELATIONS IN THE WATER OF THE ILAWA LAKES,
Akademia Rolniczo-Techniczno, Olsztyn-Kortow (Poland). Instytut Inzynierii i Biotechnologii Zywnosci.
For primary bibliographic entry see Field 5C.
W75-02926

ASSESSING EFFECTS ON WATER QUALITY BY BOATING ACTIVITY,
Florida Technological Univ., Orlando, Fla. Coll. of Engineering.
For primary bibliographic entry see Field 5C.
W75-03020

HYDROLOGIC SIMULATION AND THE ECOLOGICAL SYSTEM,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 2A.
W75-03026

NUTRIENT INPUTS AND THEIR RELATIONSHIP TO ACCELERATED EUTROPHICATION IN LAKE MICHIGAN,
Michigan Univ., Ann Arbor. Great Lakes Research Div.
For primary bibliographic entry see Field 5C.
W75-03029

A WATER QUALITY MODEL FOR A CONJUNCTIVE SURFACE-GROUNDWATER SYSTEM,
Florida Univ., Gainesville. Dept. of Environmental Engineering Sciences.
For primary bibliographic entry see Field 5B.
W75-03042

TRACE ELEMENTS IN THE BOTTOM DEPOSITS OF RESERVOIRS ON THE DNIEPER RIVER,
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
For primary bibliographic entry see Field 5B.
W75-03086

CYCLES OF MACROPHYTES AND PHYTOPLANKTON IN PUKEPUKE LAGOON FOLLOWING A SEVERE DROUGHT,
Victoria Univ., Wellington (New Zealand). Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W75-03087

EFFECTS OF RECREATION ON WATER QUALITY,
Idaho Univ., Moscow. Coll. of Forestry, Wildlife and Range Sciences.
For primary bibliographic entry see Field 5C.
W75-03094

JET-FORCED CIRCULATION IN WATER-SUPPLY RESERVOIRS,
Karlsruhe Univ. (Germany).
For primary bibliographic entry see Field 5B.
W75-03095

THE ROLE OF LAKE PROPERTY OWNERS AND THEIR ORGANIZATIONS IN LAKE MANAGEMENT,
Wisconsin Univ., Madison. Inland Lake Demonstration Project.
For primary bibliographic entry see Field 6E.
W75-03138

A METHOD FOR THE RELATIVE CLASSIFICATION OF LAKES IN THE STATE OF WASHINGTON FROM RECONNAISSANCE DATA,
Geological Survey, Tacoma, Wash.
G. C. Bortleson, N. P. Dion, and J. B. McConnell.
Water-Resources Investigations 37-74, 1974. 35 p, 1 fig, 6 tab, 32 ref, 4 append.

Descriptors: *Lakes, *Limnology, *Washington, Surveys, *Nutrients, Eutrophication, Lake morphometry, *Phosphorus, Water quality, *Water pollution sources.

A classification system was developed to allow a rapid assessment of the eutrophic potential and condition of more than 750 Washington lakes and reservoirs. The potential for nutrient enrichment from natural sources is evaluated on the basis of the interactions of physical and hydrologic factors that play a role in controlling the trophic condition of lakes, such as: (1) mean depth, (2) volume, (3) bottom slope, (4) shoreline configuration ratio, (5) ratio of drainage area to volume, (6) altitude, and (7) water-renewal time. The potential for nutrient enrichment from cultural sources is evaluated on the basis of (1) total phosphorus loading from nonpoint sources and point sources, (2) volume of water per nearshore home, and (3) percentage of shore developed. Total phosphorus loading for the lakes is calculated using criteria based on phosphorus exports from various nonpoint sources in the lake basin. Indicators of eutrophication and water quality are evaluated from phosphorus and nitrogen concentrations, specific conductance, dissolved-oxygen depletion in the hypolimnion, Secchi-disc visibility, fecal-coliform bacteria, and the abundance of rooted aquatic plants. (Knapp-USGS)
W75-03152

SPECIES DIVERSITY OF PERIPHYTON COMMUNITIES IN THE LITTORAL OF A TEMPERATE LAKE,
Victoria Univ. (British Columbia). Dept. of Biology.
S. D. Brown.
Int Rev Gesamten Hydrobiol Vol 58, No 6, p 787-800, 1973.
Identifiers: *Canada(Elk Lake), Diversity index, Lakes, Littoral, *Periphyton communities, *Species diversity, Substrates, Temperate lakes, Standing crops.

Species diversity of littoral periphyton samples from Elk Lake (British Columbia, Canada) was dependent on station location and period of substrate exposure. Site differences were not statistically exposure. Site differences were not statistically related to physico-chemical variables. However, diversity was negatively correlated with age of the communities and standing crop, and appeared to be associated with biological interaction or competition for available substrate surface. Further investigation revealed that the Shannon-Weaver index, as commonly applied, was inappropriate for data summarization since it reflected only the changes in evenness of the most abundant species. Components of the diversity index, as illustrated by the periphyton, were discussed.--Copyright 1974, Biological Abstracts, Inc.
W75-03158

THE GREAT LAKES REDISCOVERED,
Wisconsin Univ., Madison. Marine Studies Center.
For primary bibliographic entry see Field 5B.
W75-03173

GREAT LAKES ICE FORECASTING,
National Weather Service, Silver Spring, Md. Ocean Services Div.
For primary bibliographic entry see Field 2C.
W75-03177

TWO NATIONS, ONE LAKE--SCIENCE IN SUPPORT OF GREAT LAKES MANAGEMENT. OBJECTIVES AND ACTIVITIES OF THE INTERNATIONAL FIELD YEAR FOR THE GREAT LAKES 1965-1975,
National Oceanic and Atmospheric Administration, Rockville, Md.
J. O. Ludwigson.
International Field Year for the Great Lakes, Report, May 1974. 145 p, 24 fig, 6 tab.

Descriptors: *Lakes, *Management, *Limnology, *Great Lakes, Hydrology, Meteorology, Biology, Chemistry, Data collections, *International Hydrological Decade.
Identifiers: Energy balance.

Canadian and U.S. objectives and activities of the International Field Year for the Great Lakes 1965-1974 are summarized. The problems and management of the lakes are described and an explanation is given for the IFYGL. Details are given on the scientific program involving the terrestrial water balance, lake meteorology and evaporation, lake energy balance, water movements, biology and chemistry on the atmospheric boundary layer. Ancillary and supportive tasks are noted. Information is also given on data collection and the data management system. (Sinha-OEIS)
W75-03179

SHORELINE FORESTS OF LAKE TE ANAU, FIORDLAND,
Otago Univ., Dunedin (New Zealand). Dept. of Botany.
For primary bibliographic entry see Field 5C.
W75-03191

PHOTOSYNTHETIC PHYTOPLANKTON ACTIVITY IN THE IVANKOVO RESERVOIR, IN THE ZONE OF HEATED WATER FROM THE KONAKOVO STATE REGIONAL ELECTRIC POWER STATION, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
For primary bibliographic entry see Field 5C.
W75-03193

MEKY RIVER DIVERSION SCHEME,
Awash Valley Authority, Addis Ababa (Ethiopia).
For primary bibliographic entry see Field 3B.
W75-03195

SEASONAL CYCLES OF VITAMIN B12, THIAMINE AND BIOTIN IN LAKE SAGAMI: PATTERNS OF THEIR DISTRIBUTION AND ECOLOGICAL SIGNIFICANCE,
Tokyo Univ. (Japan). Ocean Research Inst.
K. Ohwada, and N. Taga.
Int Rev Gesamten Hydrobiol, Vol 58, No 6, p 851-871, 1973.
Identifiers: *Biotin, Cyclotella, *Distribution patterns, Ecological studies, Japan(Lake Sagami), Lakes, Nitzschia spp, Phytoplankton, *Seasonal cycles, Sediments, Synedra-acus, *Thiamine, *Vitamin B-12, Diatoms.

Studies at monthly intervals were done for 2 yr (1970 and 1971). They were compared with other biological and chemical factors. Sediments were rich in the 3 vitamins during the period of study and they were considered to be a vitamin source for the lake water. In the surface water, fluctuations both of dissolved and particulate forms of the vitamins corresponded with the succession of phytoplankton. The dissolved vitamin B12 concentration decreased at the same time that the particu-

late form increased in the surface water during periods of dominance by diatoms such as Cyclotella sp., Nitzschia acicularis, N. paleacea, N. actinastroides, N. palea, Nitzschia sp. and Synedra acus. The importance of vitamin B12 as one of the ecological factors in Lake Sagami was discussed.--Copyright 1974, Biological Abstracts, Inc.
W75-03205

THE FOOD OF PIKE-PERCH (LUCIOPERCA LUCIOPERCA L.) IN LAKE BALATON,
Magyar Tudomanyos Akademia, Tihany. Biological Research Inst.
P. Biro.
Ann Inst Biol (Tihany) Hung Acad Sci. 40 p 159-183. 1973 Illus.
Identifiers: Acerina-Cernua, Alburnus-Alburnus, *Hungary(Lake Balaton), Lakes, Lucioperca-Lucioperca, Neogobius-Fluviatilis, Perch, Pike, Seasonal, *Fish foods, *Pike-Perch foods.

The stomach-contents of 3347 pike-perches of 300-500 g body weight were analyzed during 1970 and 1971. The food is composed of 10 fish species to a seasonally variable extent. Among them only 2-3 play a decisive role owing to their frequency of occurrenc. They are the bleak (Alburnus alburnus), the ruff (Acerina cernua) and the pike-perch fry (Lucioperca lucioperca). When the fry appera, the food consist almost exclusively of them. The most commonly easten size groups of each food fish species can clearly be determined from the sizes of fishes found in the stomachs. The stomachs of pike-perches investigated usually contained 1-2 fish. The number of fish consumed depends on the mass appearance of fry of suitable sizes. The value of the food coefficient in the majority of cases was 0.02-2.6 (76%) and values between 2.6 and 5.1 were encountered in about 17% of the predators. The food consumption is insufficient, since the daily amount is only 1-4 g. Also the food rate is very low, hardly reaching 1% of body weight during both years. Five new species of food fish were found. Among them Neogobius fluviatilis may later achieve greater significance because of its mass appearance and propagation during recent years.--Copyright 1974, Biological Abstracts, Inc.
W75-03248

MERCURY IN SOME SWEDISH LAKE SEDIMENTS,
National Swedish Environment Protection Board, Uppsala. Limnological Survey.
For primary bibliographic entry see Field 5B.
W75-03270

REGULATION OF GREAT LAKES WATER LEVELS--APPENDIX B--LAKE REGULATION, VOL 1,
International Joint Commission-United States and Canada. Great Lakes Levels Board.
Available from International Joint Commission, through Detroit District Corps of Engineers, P.O. Box 1027, Detroit, Mich. December 7, 1964. 141 p, 59 tab, 36 fig.

Descriptors: *Water level fluctuations, *Great Lakes, Evaluation, *International Joint Commission, *Discharge(Water), Planning, Governmental interrelations, United States, Canada, Great Lakes Region, International commissions, Federal government, Regulated flow, Water policy, Comprehensive planning, Economics, Economic impact, Water resources development, Water supply, Lakes, Consumptive use, *Regulation, Water levels.
Identifiers: Environmental policy.

Results are presented of studies made under the October 7, 1964 Reference to the International Joint Commission by the Governments of the United States and Canada, relating to the regulation of the Great Lakes. Presented are plans for the regulation of the outflow from all the Great Lakes, or various combinations thereof. Included also are data reflecting the economic effect of changes in levels and flows on the major interests--shore property, commercial navigation, and power. The data, in combination with a 'hydrologic evaluation' of trial plans, formed the basis for objectives employed in development of the plans presented and evaluated in detail. Under all plans, benefits were produced. Also dealt with is the effect of consumptive use within the Great Lakes and its impact on future regulation. The results indicate a progressive lowering of mean water levels on unregulated lakes due to consumptive use, whereas fixed minimum outflows employed in the regulation plan will result in an expansion of the range on regulated lakes. (Deckert-Florida)
W75-03277

2I. Water In Plants

BIOLOGICAL EFFECTS IN THE HYDROLOGICAL CYCLE,
For primary bibliographic entry see Field 2A.
W75-03023

A SUMMARY OF RAINFALL INTERCEPTION BY CERTAIN CONIFERS OF NORTH AMERICA,
Forest Service (USDA), Wenatchee, Wash. Forest Hydrology Lab.
For primary bibliographic entry see Field 2A.
W75-03030

OBSERVING PLANT ROOT GROWTH,
Agricultural Research Service, Auburn, Ala. Soil and Water Conservation Research Div.
H. M. Taylor.
In: Biological Effects In The Hydrological Cycle, Proceedings of the Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana. p 163-172, 7 fig, 1 tab, 14 ref.

Descriptors: *Research facilities, Laboratories, Hydrologic cycle, Laboratory equipment, Root zone, *Root systems, *Plant growth, *Laboratory tests, Root development, Water utilization, Soil water, *Alabama.
Identifiers: *Rhizotron.

The rhizotron at Auburn, Alabama, is an underground walkway equipped on each side with windows for observation of plant root growth in soil. It was designed to study growth and development of plant root systems while the aerial parts of the plant are exposed to field environmental conditions. The rhizotron is 22 m long, 2.4 m deep, and 4 m wide and contains 20 soil compartments, 10 on each side of the tunnel. Initiation, growth, development, and death of roots can be studied and measured through the windows by direct observations, by viewing through microscopes, or by serial photography. The rhizotron is equipped to monitor or continuously record onto a data logging system oxygen or carbon dioxide contents in aeration studies, soil and air temperature, net radiation, and soil water status at various points within a compartment. Time-lapse cinematography equipment is also available. Continuous record of stem diameters can be made in plant water experiments by using linear variable differential transformer equipment. A neutron meter is available for soil water studies, and a beta gauge and a pressure chamber are available for plant water potential studies. Soil profiles required for various studies can be created. Briefly described were results of experiments on development of root systems and quantitative water use. (See also W75-03023) (Humphreys-ISWS)
W75-03032

ECOLOGICAL TYPOLOGY OF MACROPHYTES, (IN UKRANIAN),
Kiev State Univ. (USSR). Dept. of Higher Plants.
P. M. Potul'nytskyi, V. P. Pohrebennyk, and L. F. Kucheryava.
Ukr Bot Zh, Vol 30, No 5, p 584-590, 1973.
Identifiers: *Ecological typology, Environment, *Macrophytes(Aquatic), Morphology, Season, *USSR(Middle Dnieper river), Aquatic vegetation, Aquatic plants.

Ecology and taxonomy of aquatic macrophytes are discussed. However this relation of plant to environment during the vegetative period is not stable in those water bodies where the water level fluctuates. In the water bodies of flood plains and regulated basins, when isolating macrophyte ecotypes, the adaptable reactions related to changes in ecological stages in the water body during a year (deep-water, shallow, swampy and ground) may be taken as such a criterion. On this basis when studying ecology of aqueous macrophytes of the river flood plains in the Middle Dnieper system (USSR) 8 groups were distinguished which form 2 types and 4 subtypes. A degree of plant relation with the aqueous, air and soil environments was taken into consideration as a factor changing during the season and affecting the plant rhythm of development and reactions adaptable to growth conditions.--Copyright 1974, Biological Abstracts, Inc.
W75-03200

OBSERVATIONS ON THE LIFE HISTORY AND BURROW CONSTRUCTION OF THE CRAYFISH CAMBARUS FODIENS (COTTLE) IN A TEMPORARY STREAM IN SOUTHERN ONTARIO,
Waterloo Univ. (Ontario). Dept. of Biology.
D. D. Williams, N. E. Williams, and H. B. N. Haynes.
Can J Zool, Vol 52, No 3, p 365-370, 1974, Illus.

Descriptors: North America, *Crayfish, *Burrows, *Methodology, *Running waters.
Identifiers: Cambarus-fodiens, *Canada(Ontario), Cottle.

C. fodiens, usually considered an inhabitant of ponds and drainage ditches, is shown to be able to complete its life cycle in a temporary running-water habitat. Details of its life history are given. Sampling methods for burrowing crayfishes are briefly reviewed and a new method is described. The typical burrow construction of this species is shown to be modified at 2 stages in the life cycle, once in the ovigerous females, and again in the newly released juveniles. It is possible that other inhabitants of temporary streams use these crayfish burrows as refuges when the groundwater table retreats.--Copyright 1974, Biological Abstracts, Inc.
W75-03211

SELAGINELLA SANGUINOLENTA (L.) SPRING AS AN EDIFICATOR, (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Botanicheskii Institut.
V. I. Grubov, and N. Ulziikhutag.
Bot Zh. Vol 58, No 12, p 1807-1808. 1973.
Identifiers: Edificators, Expeditions, *Mongolia(Khangai district), Mountains, *Selaginella-Sanguinolenta, Biological studies.

During a combined Soviet-Mongolian biological expedition in the summer of 1972 in the northwestern outskirts of the Khangai district (Mongolia) in the small granite Argalantu-Ula range along the left bank of the Tesiin-Gola river, the entire eastern macroslope of the range, facing the river, from the start of the shelf to the very crest, with the exception of the almost perpendicular cliffs, was found to be almost solidly covered with S. sanguinolenta, imparting to the slope a unique olive-green color. The composition of this association is presented. --Copyright 1974, Biological Abstracts, Inc.
W75-03242

THE EFFECT OF NUTRITION AND WATER RELATIONS ON THE CA CONTENT IN THE NEEDLES OF PINE SEEDLINGS, (IN GERMAN),
Technische Universitaet, Dresden (East Germany).
M. Heinze.
Flora(Jena). Vol 162, No 5, p 426-436. 1973. (English summary).
Identifiers: *Calcium, Ions, Needles, *Nitrogen, Nutrients, Nutrition, *Pine seedlings, Soils, Transpiration, *Fertilization, Water supply.

Ca fertilization and increased water supply enhance the Ca concentration in the needles. N fertilization lowers it, also dosages that exceed the optimum value. The Ca concentration in the needles does not correlate with growth, but correlates well with water consumption per g needle matter. If under the conditions of equal Ca supply by the soil, the Ca concentration is taken as a measure for the transpiration intensity, then in the same climate, transpiration is most intensive at a low nutrient ion concentration in the soil solution (lowest N supply, highest water supply). Transpiration decreases with increasing nutrient ion concentration in the soil solution.--Copyright 1974, Biological Abstracts, Inc.
W75-03243

SOME REED-LIKE COMMUNITIES OF UPPER RHINE AREA, (IN GERMAN),
Landessammlungen fuer Naturkunde, Karlsruhe (West Germany).
G. Philippi.
Beitr Naturkd Forsch Suedwestdtsch. 32 p, 53-95. 1973 Illus. (English summary).
Identifiers: Braun-Blanquet, *Reed communities, *West Germany(Upper Rhine area), Methodology, Reviews.

Some reed-like communities (Class Phragmitetea) of the upper Rhine region are described using Braun-Blanquet's principles. Some material from older surveys along with more recent observations were incorporated into this review.--Copyright 1974, Biological Abstracts, Inc.
W75-03244

FORMATION OF A BUSHY HABITUS OF THE WHITE ASH UNDER THE EFFECT OF SOIL WATER SHORTAGE, (IN RUSSIAN),
Akademiya Nauk Armyanskoi SSR, Erevan. Institut Botaniki.
A. O. Mkrtchyan.
Biol Zh Arm , Vol 26, No 10, p 20-27. 1973 Illus.
Identifiers: *Bushy habitats, Fraxinus-Americana, Irrigation, *Soil water, *White ash, Water shortage, *Soil-water-plant relationship., Trees.

Individual white ash (Fraxinus americana) trees growing in extremely coarse-textured (single-grain) uncultivated and unirrigated soil were transformed into bushes with a height of 0.6 m at an age of 40 yr; normal white ash under irrigation had a height of 12m at the same age. Upon transplantation to irrigated plots the acquired bushy form retained.--Copyright 1974, Biological Abstracts, Inc.
W75-03245

PROPOSAL FOR INTERNATIONAL COMPARATIVE INVESTIGATIONS OF PRODUCTION BY STANDS OF REED PHRAGMITES COMMUNIS,
Ceskoslovenska Akademie Ved, Trebon. Botanicky Ustav.
D. Dykyjova, S. Hejny, and J. Kvet.
Folia Geobot Phytotaxon. Vol 8, No 4, p 435-442. 1973.
Identifiers: International studies, Morphology, *Phragmites-communis, Production, *Reed stands, *Shoot biomass, Leaf area index.

Methodological recommendations are given for comparative investigations of production by invasion stands of reed (P. communis Trin). The comparisons are mainly based on estimates of the seasonal maximum shoot biomass and leaf area index. Recommendations for a quantitative morphology of the Phragmites shoots and description of the habitat are also given.--Copyright 1974, Biological Abstracts, Inc.
W75-03246

STUDIES WITH DISCONTINUOUS CULTURES AND THEIR APPLICABILITY IN WATER PROGNOSIS, (IN GERMAN),
Zentralinstitut fuer Molekularbiologie, Berlin (East Germany); and Zentralinstitut fuer Mikrobiologie und Experimentelle Therapie, Jena (East Germany).
R. Koschel, and L. Kuechler.
Limnologica. Vol 9, No 1, p 133-142. 1974 Illus.
Identifiers: Ankistrodesmus-sp, Applicability, Asterionella-formosa, *Cultures, Fragilaria-crotonensis, *Haematococcus-pluvialis test, Productivity, Scenedesmus-obliquus, *Light-dark bottle oxygen method, Methodology.

The light-dark bottle oxygen method is limited, since the short test lies within the adaptation period of Asterionella formosa, Fragilaria crotonensis, Ankistrodesmus sp. and Scenedesmus obliquus to their changed milieu. The production potential of water and its minimum material content can be detected with the Haematococcus pluvialis test. Each method is described.--Copyright 1974, Biological Abstracts, Inc.
W75-03247

LIMNOLOGICAL INVESTIGATIONS OF A FISH-POND SUPPLIED WITH SEWAGE-WATER IN THE VICINITY OF LAKE BALATON,
Magyar Tudomanyos Akademia, Tihany. Biological Research Inst.
J. Ponyi, P. Biro, J. Olah, N. P-Zankai, and G. Tamas.
Ann Inst Biol (Tihany) Hung Acad Sci, 40, p 227-284, 1973, Illus.
Identifiers: Algae, Carp, Cladocera, *Fish food, *Hungary(Lake Balaton), Lakes, Limnological studies, Mortality, Oxygen, Plankton, *Sewage water, Soils, Zooplankton, *Fish ponds, *Food chains.

The distribution of the total planktonic biomass is uneven in the transverse section of the pond; it is about 4-7% lower in the vicinity of the inflow of sewage water than at other places. The zooplankton plays a secondary role in the planktonic community during the warm-water period, as compared to the algal biomass. The almost complete absence of Daphinia species as well as the secondary role of the other Cladocera during the summer season indicate a limited transfer of the algal biomass increased by the sewage water along the food chain. On the basis of the bacterial biomass, the pond can be classified as having high productivity and medium loading. The boggy soil of the pond is rich in organic substances (N, P2O5) Fe and sulphate ions. There exists a danger of the formation of H2S because of the O2-shortage at the mud-surface during summer. Carp production is generally high and, apart from the varying mortality, it depends on the quantity and quality of the fishes planted as well as on the feeding. The rate of growth of different fishes varied; the increase of body weight and length of carp lagged that of other fishes. Its mortality was high and the survival rate was low. The slow growth of carp can be explained by the poor natural food of animal origin. The white and spotty grass carps consuming algae and small benthic animals, displayed intense growth, low mortality and the best adaptation to the environment.--Copyright 1974, Biological Abstracts, Inc.
W75-03249

FEEDING OF THE SPECKLED CARP (ARISTICHTHYS NOBILIS RICH) IN A POLYCULTURE WITH THE CARP, (IN RUSSIAN),
M. F. Yaroshenko, and E. V. Danchenko.
Izv Akad Nauk Mold SSR Ser Biol Khim Nauk, 5, p 72-77, 1973, Illus.
Identifiers: Aristichthys-nobilis, *Carp, Cyprinus-carpio, Detritus, Plankton, *Speckled carp, Zooplankton, Aquatic animals, Aquatic plants, *Fish foods, Polyculture.

The results of experimental investigations under natural conditions of the feeding of speckled carp (A. nobilis) with different stocking density with respect to carp (Cyprinus carpio) are presented. With a density of the polyculture of 4700 carp to 500 speckled carp the latter feed predominantly on zooplankton and their food competition with the carp was low. With an increase of speckled carp to 3000-4700/ha the food competition increased and the speckled carp changed to feeding primarily on detritus and animal and plant organisms contained in it. Thus an increase in speckled carp in a polyculture with carp promotes the conversion of additional biological resources to food fish production.--Copyright 1974, Biological Abstracts, Inc.
W75-03251

EFFECTS OF ANTITRANSPIRANTS ON SEED GERMINATION, GROWTH AND SURVIVAL OF TREE SEEDLINGS,
Purdue Univ., Lafayette, Ind. Dept. of Forestry and Conservation.
W. R. Chaney, and T. T. Kozhowski.
Plant Soil, Vol 40, No 1, p 225-229, 1974, Illus.
Identifiers: *Antitranspirants, *Germination, Growth rates, Leaf, *Pinus-resinosa, *Robinia-pseudoacacia, Seedling survival, *Tree seedlings, Weight, Organic compounds.

Adol (cetyl alcohol) had negligible effects on germination of Pinus resinosa Ait. and Robinia pseudoacacia L. seeds whereas TAG (polyethylene-based emulsion), Foligard (acrylic polymer fortified with a humectant) and Geon Vinyl Latex reduced the rate and final percent germination in proportion to dosage. When applied to the soil surface, some concentrations of Foli-gard increased dry weight accumulation and Geon Vinyl Latex improved leaf water balance of surviving seedlings of R. pseudoacacia. Adol had no effect when applied to the soil surface.--Copyright 1974, Biological Abstracts, Inc.
W75-03253

ANTHOCYANIN DEVELOPMENT IN MANGO FRUIT IN RESPONSE TO A PREHARVEST ANTITRANSPIRANT SPRAY,
Florida Univ., Homestead. Inst. of Food and Agricultural Sciences.
C. R. Barmore, D. H. Spalding, and R. T. McMillan, Jr.
Hortscience, Vol 9, No 2, p 114-115, 1974.
Identifiers: *Antitranspirants, *Fruits, Harvest, Mangifera-indica, *Mango, Sprays, *Anthocyanin, Organic compounds.

Preharvest development of external red color of 'Irwin' and 'Keitt' mango (Mangifera indica L.) was enhanced with an application of the antitranspirant poly-l-p-menthen-8-9 diyl (Vapor Gard) prior to commercial fruit maturity. Both the percentage of fruit surface area showing red color and intensity of the red color was increased. Red color development in storage at 21C was not affected by Vapor Gard. This effect was specific for the anthocyanin pigment(2S). Colorimetric measurements in both yellow and green areas indicated that Vapor Gard did not affect disappearance of chlorophyll and development of yellow color at time of or following harvest.--Copyright 1974, Biological Abstracts, Inc.
W75-03254

THE EFFECT OF IMMERSION IN WATER ON THE IMMATURE STAGES OF THE IXODID TICKS, RHIPICEPHALUS APPENDICULATUS NEUMANN 1901 AND AMBLYOMMA VARIEGATUM FABRICUS 1794,
Liverpool Univ. (England). Faculty of Veterinary Science.
M. W. Smith.
Ann Trop Med Parasitol, Vol 67, No 4, p 483-492, 1973.
Identifiers: Amblyomma-variegatum, Cattle, Immersion, Life cycle, Rainfall, Rhipicephalus-appendiculatus, *Ticks(Ixodid), *Uganda.

Standard groups of eggs, and of unfed and engorged larvae and nymphs of the Ixodid ticks R. appendiculatus and A. variegatum were immersed in 4 cm water at a known pH and at a temperature and a relative humidity similar to that experienced by these tick species under field conditions in Uganda. The effects of such immersion compared with the life cycle of normal breeding colonies maintained under the same but dry conditions is recorded. Under field conditions the larval populations of A. variegatum on cattle will fluctuate more than those of R. appendiculatus relative to rainfall distribution, and much larger populations of A. variegatum larvae may be expected in the dry seasons. There is likely to be a much greater death rate amongst immature A. variegatum ticks (expecially when engorged) than amongst R. appendiculatus during the wet seasons; hence there will be relatively larger populations of R. appendiculatus nymphs and adults compared with A. variegatum as the wet season proceeds. The possible adverse effects of immersion on the survival and egg laying capacity of engorged females of both species as the wet seasons progress must also be considered when assessing the reasons for the reduction in larval tick populations on cattle.--Copyright 1974, Biological Abstracts, Inc.
W75-03258

NOTES ON WATER RELATIONS OF POLYTRICHUM COMMUNE HEDW,
Aberdeen Univ. (Scotland). Dept. of Botany.
N. G. Bayfield.
J Bryol, Vol 7, No 4, p 607-617, 1973, Illus.
Identifiers: Leaf, *Polytrichum-commune, *Mosses(Endohydric), *Rhacomitrium-lanuginosum, Shoots, *Water loss.

Water loss in the endohydric moss P. commune was controlled by a complex series of leaf arrangement changes, and by changes in water potential deficit of the shoots. This contrasted with the water relations of the ectohydric moss Rhacomitrium lanuginosum in which there was apparently little control over loss. Water conduction in Polytrichum was predominantly internal under high evaporative flux, and external under moderate flux, but under many stress conditions both pathways would probably be necessary to maintain an optimum water balance.--Copyright 1974, Biological Abstracts, Inc.
W75-03265

INFLUENCE OF PEAT MOSS ON SOIL WATER RETENTION FOR PLANTS,
Department of Agriculture, Summerland (British Columbia). Research Station.
D. S. Stevenson.
Can J Soil Sci Vol 54, No 1, p 109-110, 1974.
Identifiers: *Soil bulk density, Mosser, *Peat moss, *Soil water, Vegetation, *Soil-water-plant relationships.

Since addition of peat decreases soil bulk density, such addition may either increase, decrease or not change the amount of water available, depending on the original pore diameter.--Copyright 1974, Biological Abstracts, Inc.
W75-03287

2J. Erosion and Sedimentation

PROBLEMS OF GREAT LAKES SHORE EROSION,
Wisconsin Univ., Milwaukee. Dept. of Mechanics.
For primary bibliographic entry see Field 4D.
W75-02755

BED FORM DEVELOPMENT AND DISTRIBUTION PATTERN, PARKER AND ESSEX ESTUARIES, MASSACHUSETTS,
Massachusetts Univ., Amherst. Coastal Research Center.
For primary bibliographic entry see Field 2L.
W75-02807

SELECTED HYDROLOGIC DATA, SAGEHEN CREEK BASIN NEAR TRUCKEE, CALIFORNIA, 1954-72,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 7C.
W75-02811

SEDIMENT DISCHARGE IN THE LAKE TAHOE BASIN, CALIFORNIA, 1973 WATER YEAR,
Geological Survey, Menlo Park, Calif.
C. G. Kroll.
Geological Survey open-file report 74-259, November 1974. 65 p, 2 fig, 8 tab, 8 ref, 2 append.

Descriptors: *Sediment yield, *Sediment discharge, *California, Sedimentation, Erosion, Roads, Erosion control, Suspended load, Snowmelt, Sediment load, Basic data collections, Hydrologic data, Runoff.
Identifiers: *Lake Tahoe basin(Calif).

Streamflow and fluvial-sediment discharge data are being collected at selected streams and highway gutters in the Lake Tahoe basin to determine the extent of erosion from highway cuts and to attempt to evaluate the effects of various land-treatment practices to reduce erosion. This is the second progress report. Precipitation in the Lake Tahoe area during 1973 was 94 percent of normal. Seventy-one percent of the total annual runoff during the 1973 water year occurred from March through June 1973. Sediment samples were collected during the year at streamflow stations and at gutterflow stations at highway cuts to define the range of transport conditions. The major part (74 percent) of the annual suspended-sediment discharge from streams during the 1973 water year occurred during the snowmelt runoff period, March through June. (Knapp-USGS)
W75-02817

CONTROL OF EROSION,
Tup (Panama) S.A., Panama City. (assignee)
For primary bibliographic entry see Field 8B.
W75-02845

THE SEDIMENT-TRANSPORTING CAPACITY OF ALLUVIAL STREAMS,
J. L. Bogardi.
Acta Technica Academiae Scientiarum Hungaricae, Vol 75, No 1-4, p 59-70, 1973. 3 fig, 9 ref.

Descriptors: *Alluvial channels, *Sediment transport, *Sediment load, Suspended solids, Boundary layers, Boundaries(Property), Mathematical studies, Estimating equations, Hydrologic aspects, Rivers.
Identifiers: Danube River, *Tisza River(Hungary), *Raba River(Hungary), *Hungary.

No exact method is available today for determining the sediment-transporting capacity of alluvial streams. For this reason the work per unit time expended for keeping the sediment in suspension is related to the full energy consumption of the sediment-carrying stream in unit time. The sediment carried in streams is in general less than the amount pertaining to saturation and thus the sediment-transporting capacity estimated from observed concentration is essentially not more than a theoretical transporting capacity related to a particular gaging section and influenced by the combination of all hydrologic factors. Besides the detailed treatment of various relations on sediment-transporting capacity, a physically well founded parameter is introduced. The sediment-transporting capacity of the Danube, the Tisza and the Raba rivers is examined by comparing the values defining the boundary conditions of channel erosion and saturation. (Sandoski-FIRL)
W75-02871

KINETICS OF PHOSPHATE ADSORPTION AND DESORPTION BY LAKE SEDIMENTS,
Maine Univ., Orono. Dept. of Plant and Soil Sciences.
For primary bibliographic entry see Field 5C.
W75-02904

NUTRIENTS AND SUSPENDED SEDIMENTS FOR FORESTED WATERSHEDS IN THE EAST-CENTRAL SIERRA NEVADA,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 5B.
W75-02984

TRACE ELEMENTS IN THE BOTTOM DEPOSITS OF RESERVOIRS ON THE DNIEPER RIVER,
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
For primary bibliographic entry see Field 5B.
W75-03086

TEMPERATURE EFFECTS IN FLOWS OVER NONPLANAR BEDS,
Civil Engineering Lab. (Navy), Port Hueneme, Calif.
For primary bibliographic entry see Field 8B.
W75-03088

SHORELINE EROSION IN UPPER CHESAPEAKE BAY: THE ROLE OF GROUNDWATER,
Westinghouse Ocean Research Lab., Annapolis, Md.
For primary bibliographic entry see Field 2L.
W75-03089

TESTS OF SCOUR PROTECTION FOR BRIDGE PIERS,
Connecticut Univ., Storrs. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W75-03105

DIRECTIONAL FEATURES IN BRAIDED-MEANDERING-STREAM DEPOSITS, CIMARRON RIVER, NORTH-CENTRAL OKLAHOMA,
Oklahoma State Univ., Stillwater. Dept. of Geology.
J. W. Shelton, H. R. Burman, and R. L. Noble.
Journal of Sedimentary Petrology, Vol 44, No 4, p 1114-1117, December 1974. 3 fig, 1 tab, 4 ref.

Descriptors: *Sediment transport, *Bed load, *Alluvial channels, *Oklahoma, Sedimentary structures, Braiding, Meanders.
Identifiers: *Cimarron River(Okla).

Directional features in sand of the Cimarron River of Oklahoma correspond well to the river and sand trends. Grain orientation and parting lineation in horizontal beds are the most accurate current indicators. The greater variation in direction shown by small-scale and medium-scale crossbedding

reflects local orientations of the depositing currents. (Knapp,USGS)
W75-03159

YUKON RIVER SEDIMENT ON THE NORTHERNMOST BERING SEA SHELF,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 2L.
W75-03160

PP'-DDT ADSORPTION TO SUSPENDED PARTICULATE MATTER IN SEA WATER,
Rhode Island Univ., Kingston. Dept. of Food and Resource Chemistry.
For primary bibliographic entry see Field 5B.
W75-03174

MARINE STUDIES OF SAN PEDRO BAY, CALIFORNIA. PART VII. SEDIMENT COMPOSITIONS IN LOS ANGELES-LONG BEACH HARBORS AND SAN PEDRO BASIN,
University of Southern California, Los Angeles. Environmental Engineering.
For primary bibliographic entry see Field 5B.
W75-03176

SCOUR AND DEPOSITION--CHANGES IN SEDIMENTATION AROUND A NUCLEAR POWER PLANT,
Wisconsin Univ., Madison. Geo-Environmental and Mineral Resources Program.
M. H. Kohler, and J. R. Moore.
Sea Grant College Program Technical Report WIS-SG-74-223, September 1974. 264 p, 150 fig, 15 tab, 129 ref.

Descriptors: *Sedimentation, *Nuclear powerplants, *Deposition, *Erosion, *Powerplants, *Lakes, Cooling water, Beaches, Wisconsin, Lake Michigan.
Identifiers: Coastal zone, Littoral zone.

The sedimentary regime of Lake Michigan between Two Rivers and Two Creeks, Wisconsin was investigated because two new nuclear power plants are located along this shoreline and discharge cooling water into the lake. One of them, Point Beach Nuclear Power Plant, began operating in late 1970, discharging cooling water at the littoral zone. The problem centered on the nature of man-induced changes in patterns of natural sediment dispersal, erosion and deposition, both offshore and on the beach, because of water jetted perpendicularly into the lake at the shoreline. Background radiation measurements revealed that the clays and muddy sands produced the highest radioactivity levels. Gravelly sand had the lowest levels with sands having intermediate values. Along the shoreline lakeward of Point Beach Nuclear Power Plant, an anomalous area of sand deposition has formed since the power plant began operation. Because this deposition is unnatural and not in equilibrium with the natural lake environment, it has been identified as a favorable prospect for economic exploitation. To date, no evironmental degradation, as measured in the form of increased shore erosion, has been, found due to the anomalous area of sand deposition associated with the power plant discharge. (NOAA)
W75-03178

SEDIMENTARY STRUCTURES OF A MODERN LAGOONAL ENVIRONMENT: PAMLICO SOUND, NORTH CAROLINA,
North Carolina Univ., Chapel Hill. Dept. of Geology.
For primary bibliographic entry see Field 8B.
W75-03180

INFLUENCE OF SEDIMENTARY PROCESSES ON GRAIN SIZE DISTRIBUTION CURVES OF BOTTOM SEDIMENTS IN THE SOUNDS AND ESTUARIES OF NORTH CAROLINA,
North Carolina Univ., Chapel Hill. Dept. of Geology.
For primary bibliographic entry see Field 2L.
W75-03181

METHOD AND APPARATUS FOR MEASURING PARTICLE CONCENTRATION IN A FLUID SUSPENSION OF PARTICLES,
For primary bibliographic entry see Field 7B.
W75-03204

MERCURY IN SOME SWEDISH LAKE SEDIMENTS,
National Swedish Environment Protection Board, Uppsala. Limnological Survey.
For primary bibliographic entry see Field 5B.
W75-03270

2K. Chemical Processes

THE USE OF A NON-DISPERSIVE ATOMIC FLUORESCENCE SPECTROMETER FOR THE DETERMINATION OF ZINC IN SOILS AND NON-FERROUS METAL ALLOYS,
Imperial Coll. of Science and Technology, London (England). Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-02827

PHOTOMETRIC TITRATION OF CHROMIUM (VI) AND VANADIUM (V) IN A MIXTURE,
Bhabha Atomic Research Centre, Bombay (India).
For primary bibliographic entry see Field 5A.
W75-02828

A CARBON TUBE FOR THE ANALYSIS OF WATER BY FLAMELESS ATOMIC ABSORPTION SPECTROMETRY,
Australian Atomic Energy Commission, Lucas Heights (Australia).
For primary bibliographic entry see Field 5A.
W75-02829

THE OCCURRENCE AND VARIABILITY OF MICROELEMENTS IN THE WATER IN THE LONGITUDINAL SECTION OF THE RIVER NIDA,
Polish Academy of Sciences, Krakow. Zaklad Biologii Wod.
For primary bibliographic entry see Field 5A.
W75-02831

AUTOMATED WET CHEMICAL MICROCOULOMETRIC ANALYZER FOR CHLORIDE ION,
California Univ., Riverside. Dept. of Entomology.
For primary bibliographic entry see Field 5A.
W75-02873

ELECTRONIC STRUCTURE AND STATES OF PURE AND DOPED WATER,
Delaware Univ., Newark. Dept. of Physics.
For primary bibliographic entry see Field 1B.
W75-02883

HYDROCHEMICAL INVESTIGATIONS OF THE CENTRAL KENTUCKY KARST AQUIFER SYSTEM,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 3B.
W75-02891

HYDROGEOCHEMICAL INVESTIGATION OF SELECTED WATERSHEDS IN SOUTHWESTERN MONTANA,
Montana Bureau of Mines and Geology, Butte.
For primary bibliographic entry see Field 5B.
W75-02983

ENVIRONMENTAL APPLICATIONS OF ADVANCED INSTRUMENTAL ANALYSES: ASSISTANCE PROJECTS, FY 73,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
For primary bibliographic entry see Field 5A.
W75-03041

THE DETERMINATION OF VOLATILE ORGANIC COMPOUNDS AT THE MICROGRAM/L LEVEL IN WATER BY GAS CHROMATOGRAPHY,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5A.
W75-03043

THE OCCURRENCE OF ORGANOHALIDES IN CHLORINATED DRINKING WATERS,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5A.
W75-03044

WATER QUALITY INDEX APPLICATION IN THE KANSAS RIVER BASIN,
National Sanitation Foundation, Ann Arbor, Mich.
For primary bibliographic entry see Field 5A.
W75-03047

ION SELECTIVE MEMBRANE ELECTRODES FOR WATER POLLUTION MONITORING,
State Univ. of New York, Buffalo. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-03048

RELATIVE EFFICIENCY OF SEVERAL ATOMIZATION AND SAMPLE INTRODUCTION SYSTEMS IN ANALYTICAL ATOMIC SPECTROMETRY,
California Inst. of Tech., Pasadena. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-03060

DETERMINATION OF LEAD IN PAINT WITH FAST NEUTRONS FROM A CALIFORNIUM-252 SOURCE,
National Bureau of Standards, Washington, D.C. Activation Analysis Section.
For primary bibliographic entry see Field 5A.
W75-03065

DIRECT DETERMINATION OF HEAVY ELEMENTS IN BIOLOGICAL MEDIA BY SPARK SOURCE MASS SPECTROMETRY,
North Carolina Univ., Chapel Hill. Dept. of Pathology.
For primary bibliographic entry see Field 5A.
W75-03066

APPLICATION OF THE CARBON ROD ATOMIZER TO THE DETERMINATION OF MERCURY IN THE GASEOUS PRODUCTS OF OXYGEN COMBUSTION OF SOLID SAMPLES,
Montana State Univ., Bozeman. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-03067

LIQUID-LIQUID EXTRACTION OF ZINC WITH ALIQUAT 336-S-1 FROM AQUEOUS IODIDE SOLUTIONS,
Texas Southern Univ., Houston. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-03068

THE ANALYSIS OF SLAG FOR COPPER, TOTAL IRON, IRON (II), AND IRON (III) BY TITRATION, CONTROLLED POTENTIAL COULOMETRY AND ELECTRODEPOSITION,
Henry Krumb School of Mines, New York.
For primary bibliographic entry see Field 5A.
W75-03069

DIRECT POTENTIOMETRIC DETERMINATION OF CALCIUM IN WATERS WITH A CONSTANT COMPLEXATION BUFFER,
Warsaw Univ. (Poland). Inst. of Fundamental Problems in Chemistry.
For primary bibliographic entry see Field 5A.
W75-03072

SEPARATION AND DETERMINATION OF TIN BY LIQUID-SOLID CHROMATOGRAPHY,
Ames Lab., Iowa.
For primary bibliographic entry see Field 5A.
W75-03075

CHROMATOGRAPHIC SEPARATION OF METAL IONS ON LOW CAPACITY MACRORETICULAR RESINS,
Ames Lab., Iowa.
For primary bibliographic entry see Field 5A.
W75-03076

CHARACTERISTICS OF STREAMFLOW AND GROUNDWATER CONDITIONS IN THE BOISE RIVER VALLEY, IDAHO,
Geological Survey, Boise, Idaho.
For primary bibliographic entry see Field 2E.
W75-03151

MATHEMATICAL GENERALIZATION OF STREAM TEMPERATURE IN CENTRAL NEW ENGLAND,
Geological Survey, Boston, Mass.
G. D. Tasker, and A. W. Burns.
Water Resources Bulletin, Vol 10, No 6, p 1133-1142, December 1974. 2 fig, 1 tab, 9 ref.

Descriptors: *Water temperature, *New England, *Forecasting, *Time series analysis, Statistical models, Fourier analysis, Statistical methods, Mathematical models, Water quality.

The empirical fit of an annual harmonic function to stream temperature measurements in central New England can be improved by considering a harmonic period of less than 365 days instead of 365 or 366 days. Generalized equations, developed using periodic temperature data from 27 streamflow stations, allow predictions of stream temperature at any site given (1) the mean basin altitude, and (2) station latitude. A sample of stream-temperature data from 27 stations was used to investigate the feasibility of regionalizing stream-temperature characteristics. Generalized equations allow predictions of stream temperature at nonmeasured sites. These generalized equations for estimating stream-temperature characteristics probably can be improved by utilizing (1) stream-temperature data for many more sites, (2) continuous temperature measurements for several sites, (3) definition of other possibly significant indices as independent variables, and (4) improved methods of regionalization. (Knapp-USGS)
W75-03157

COLLABORATIVE TESTS OF WATER ANALYSIS (THE CHEMAQUA PROGRAMME): I. SODIUM, POTASSIUM, CALCIUM, MAGNESIUM CHLORIDE, SULPHATE, BICARBONATE, CARBONATE, AND CONDUCTIVITY,
Department of Scientific and Industrial Research, Lower Hutt (New Zealand). Chemistry Div.
For primary bibliographic entry see Field 5A.
W75-03268

STUDY OF THE BEHAVIOR OF COPPER ION-SELECTIVE ELECTRODES AT SUB-MICROMOLAR CONCENTRATION LEVELS,
Wisconsin Univ., Madison. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-03298

A TURBULENT TUBULAR ELECTRODE,
Wisconsin Univ., Madison. Dept. of Chemistry.
W. J. Blaedel, and G. W. Schieffer.
Analytical Chemistry, Vol 46, No 11, p 1564-1567, September 1974. 6 fig, 21 ref. OWRR A-053-WIS(2). 14-31-0001-4050.

Descriptors: Design, *Electrodes, *Turbulence, *Electrochemistry, Equipment, *Instrumentation, Measurement.
Identifiers: *Tubular electrodes.

The design and construction of a tubular electrode in which turbulence is impressed by a twisted Teflon stirrer rotating inside the tube are described. Current-voltage curves are reported for various stirrer speeds. The limiting current is independent of flow rate for stirrer speeds greater than 1500-2000 rpm and proportional to the cube root of the flow rate at low stirrer speeds. The limiting current is linear with respect to concentration at both low and high stirrer speeds, and a fivefold increase in sensitivity is obtained at the higher stirrer speeds. The effect of changing the shape of the stirrer is studied.
W75-03300

2L. Estuaries

INTERNAL SURGES IN COASTAL WATERS,
Scripps Institution of Oceanography, La Jolla, Calif.
C. D. Winant.
Journal of Geophysical Research, Vol 79, No 30, p 4523-4526, October 20, 1974. 8 fig, 20 ref.

Descriptors: *Surges, *Ocean currents, *Basic data collections, *Pressure measuring instruments, *Water temperature, Shallow water, Water circulation, Energy, Water levels, Oceanography, California.
Identifiers: *Energy flux, Multiple element thermistor, La Jolla(Calif).

A multiple element thermistor chain was installed at the end of Scripps pier in La Jolla, California, in 5 meters of water along with a pressure sensor to record sea surface fluctuations. Temperature fluctuations throughout the water column are characterized by the occurrence of events, times during which a significant thermal gradient, of the order of or greater than those associated with the seasonal thermocline in deeper waters, exists in the water column. Temperature differences between the bottom and the surface of up to 5C have been measured. It was indicated that (1) the onset of events can be very rapid, occurring during times of the order of 1 second; (2) motions exist in the water column at frequencies much higher than the buoyance frequency that are not directly coupled to the surface wave field, and (3) events are likely to be strongly three-dimensional in such shallow waters. Extrapolations of observations at Scripps pier on a worldwide scale indicated that such events can be responsible for an energy flux into shoal waters ranging between two-tenths of a million to twenty million kilowatts. (Singh-ISWS)
W75-02791

TEMPORAL REFERENCE LINE HOLOGRAMS FROM A WATER SURFACE,
Texas Univ., Austin. Dept. of Electrical Engineering.
J. Knopp, and E. L. Hixson.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-778 482, $4.25 in paper copy, $2.25 in microfiche. Technical Memorandum No 40, October 1973. 55 p, 19 fig, 18 ref.

Descriptors: *Waves(Water), *Instrumentation, *Photography, *Analytical techniques, Methodology, Evaluation, Model studies, Wavelengths, Monitoring, Interfaces, Acoustics, Theoretical analysis.
Identifiers: *Holography, *Wave front, Line waves, Laser beams.

A new area for the application of holographic techniques was investigated. A point source radiator located on the two-dimensional plane formed by an air-water interface was imaged by using holography. A schlieren photograph was taken of the surface pattern produced by a radiating point source of capillary waves on water. Temporal reference line holograms were removed from the photographed pattern by using a slit-shaped mask. Reconstructed images were formed in the converging beam of a helium-neon laser. The images were observed on a vidicon screen through a closed circuit television monitor. A theoretical study of capillary waves was made and some experiments were conducted in the generation and observation of these waves. Some suggestions were made to apply this new development to two-dimensional wave structures. (Singh-ISWS)
W75-02793

A MULTILAYER HYDRODYNAMICAL-NUMERICAL MODEL (W. HANSEN TYPE): MODEL DESCRIPTION AND OPERATING/RUNNING INSTRUCTIONS. PART II,
Environmental Prediction Research Facility (Navy), Monterey, Calif.
T. Laevastu.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-778 619, $4.25 in paper copy, $2.25 in microfiche. Technical Note, No 2-74, January 1974. 54 p, 3 ref, 3 append.

Descriptors: *Tides, *Ocean currents, *Viscosity, *Computer programs, *Mathematical studies, *Interfaces, *Roughness coefficient, Mixing, Boundary processes, Sea level, Model studies, Dispersion, Diffusion, Pollutants, *Path of pollutants.
Identifiers: *Multi-layer hydrodynamical model, Thermohaline currents.

The multilayer Hydrodynamical-Numerical (HN) model (W. Hansen type) is, in many respects, similar to Hansen's single-layer HN model. The hydrodynamical formulas present vertically integrated motion through given layers. The lower layer is partly driven by friction, which is proportional to the mean density relations of the layers, and partly by horizontal pressure gradients caused by the inclination of the surface as well as of the interface. The finite difference forms are similar to those used in single-layer models, except for the additional terms dictated by the second layer. The model uses a continuity equation in its direct, physically simple and correct form. In respect to the inputs, the model is also similar to the single-layer HN model, with the exception of additional inputs of second layer thickness and internal tides in the second layer. Besides the basic formulas of the model, this report describes the numerical model in FORTRAN. The description of the input parameters, abbreviations used, and the program itself were given in the appendixes. The model has not been fully optimized for routine production runs. (Singh-ISWS)
W75-02798

COMPUTATION OF TIDES, CURRENTS AND DISPERSAL OF POLLUTANTS IN LOWER BAY AND APPROACHES TO NEW YORK WITH FINE AND MEDIUM GRID SIZE HYDRODYNAMICAL-NUMERICAL MODELS. PART 3,
Environmental Prediction Research Facility (Navy), Monterey, Calif.
T. Laevastu, M. Clancy, and A. Stroud.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-778 610, $4.25 in paper copy, $2.25 in microfiche. Technical Note No 3-74, January 1974. 51 p, 50 fig, 4 ref.

Descriptors: *Estuaries, *Tides, *Dispersion, Pollutants, *Ocean currents, *New York, Wind tides, Mathematical studies, Boundary processes, Hydraulic models, Coriolis force, Hydrodynamics, Model studies, Numerical analysis, *Path of pollutants.
Identifiers: Grid size.

The results were summarized of two different hydrodynamical-numerical model applications with different grid sizes: one with a small grid size for the Lower Bay of New York, and the second with a larger grid size for the Approaches to New York. The tides were prescribed at the open boundaries of these models utilizing the available tidal harmonics, and for verification, the available tidal harmonics inside the grids were used. A uniform wind field was introduced in some of the model runs representing the average prevailing wind during summer or winter. Furthermore, the outflow from the Hudson River and that coming from Long Island Sound through the East River was prescribed either in the river itself in the fine grid model, or at The Narrows in the coarse grid model. The currents within the Lower Bay and its Approaches are essentially tidal. The outflowing water shows the turning of the main flow to the right under the influence of Coriolis force. The experiments on the computation of dispersion and diffusion of pollutants showed a very rapid dispersion of the pollutants within the Lower Bay under the influence of relatively strong tidal currents in relatively shallow water. (Singh-ISWS)
W75-02799

REMOTE SENSING AS AN AID FOR MARSH MANAGEMENT,
Louisiana State Univ., Baton Rouge. Div. of Engineering Research.
For primary bibliographic entry see Field 7B.
W75-02800

REMOTE SENSING REPORT, GALVESTON BAY, HOUSTON SHIP CHANNEL, TRINITY BAY, HOUSTON, TEXAS FOR FEBRUARY 1972.
National Field Investigations Center - Denver, Colo.
For primary bibliographic entry see Field 5B.
W75-02801

THE HYDROGRAPHY OF ELKHORN SLOUGH, A SHALLOW CALIFORNIA COASTAL EMBAYMENT,
California State Univ., San Jose. Dept. of Natural Science.
For primary bibliographic entry see Field 5A.
W75-02805

COLLECTION AND ANALYSIS OF REMOTELY SENSED DATA FROM THE RHODE RIVER ESTUARY WATERSHED,
Smithsonian Institution, Edgewater, Md. Chesapeake Bay Center for Environmental Studies.
D. W. Jenkins, and F. S. L. Williamson.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-18047, $4.25 in paper copy, $2.25 in microfiche. NASA Contractor Report-62094, Annual Report/October 10, 1971 to October 9, 1972. 72 p, 42 fig, 4 tab, 3 ref. NAS6-1913.

Descriptors: *Salt marshes, *Estuaries, *Remote sensing, *Surveys, *Wetlands, *Maryland, Chesapeake Bay, On-site investigations, Vegetation, Distribution patterns, Mapping, Evaluation, Seasonal, Autumn, Irrigation effects, Plant growth.
Identifiers: *Munsell color chips, Hog Island(Md), *Rhode River(Md).

The remote sensing study underwent a major shift in emphasis during 1972, from the study of predominately forest and field vegetation to that of salt marshes. Investigations results were presented for the following subject areas: (1) standardization of autumn coloration changes with Munsell color chips; (2) mapping old field vegetation for spray irrigation project; (3) interpretation and verification of salt marsh vegetation types by remote sensing; (4) seasonality in the marsh vegetation of Rhode River, seasonal variation in Phragmites Communis-a special case; (5) analysis of cover in three marsh vegetation types; and (6) correlations of cover, spectral signature, and productivity in Hog Island Marsh. (Humphreys-ISWS)
W75-02806

BED FORM DEVELOPMENT AND DISTRIBUTION PATTERN, PARKER AND ESSEX ESTUARIES, MASSACHUSETTS,
Massachusetts Univ., Amherst. Coastal Research Center.
J. C. Boothroyd, and D. K. Hubbard.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-777 911, $3.75 in paper copy, $2.25 in microfiche. Army Engineer Coastal Engineering Research Center, Miscellaneous Paper 1-74, February 1974. 39 p, 31 fig, 1 tab, 16 ref. DACW-72-70-C-0029 (CERC), N 00014-67-A-0230-0001-(ONR).

Descriptors: *On-site investigations, *Estuaries, *Sand waves, *Massachusetts, Tidal waters, Tidal effects, Beds, Intertidal areas, Evaluation, On-site data collections, Shape, Tides, Currents(Water), Velocity, Ripple marks, Deltas, Distribution patterns.
Identifiers: *Parker Estuary(Md), *Essex Estuary(Md).

Velocity, depth, temperature, grain size, and bed form scale and orientation were measured for complete tidal cycles at 50 stations in two New England estuaries. Scuba observation of bed form change and migration, fathometer profiles, and 700 bed form scale and orientation readings were also carried out. This investigation led to the recognition of a sequence of bed forms based on increasing 'flow strength'. Bed form type is governed by maximum flood and ebb velocities (Umax) attained at a given locality. Velocity asymmetry and duration are important in determining bed form morphology and amount of crossbedding bimodality. Froude number (Fr) shows good correlation with bed form type only in water depths less than 2 meters. In the intertidal and shallow subtidal (less than 2 meters MLW) zone, sand waves are characterized by Umax 80 cm/sec, large velocity asymmetry (Fr = 0.15 - 0.25), planar crossbedding, little crossbedding bimodality, and dominant flood orientation. Cuspate megaripples are characterized by Umax 80 cm/sec, small velocity asymmetry (Fr = 0.25 - 0.4), festoon crossbedding, high crossbed bimodality, and no dominant orientation. In deep subtidal (greater than 2 meters MLW) areas, sand waves are the principal bed form. They show no dominant orientation. However, where Umax exceeds 80 cm/sec, megaripples are superimposed on the sand wave form and crossbedding is complex. (Humphreys-ISWS)
W75-02807

AN INVESTIGATION OF TURBIDITY IN ESTUARINE WATERS,
Connecticut Univ., Storrs. Inst. of Water Resources.
W. F. Bohlen.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-238 315, $3.25 in paper copy, $2.25 in microfiche. Completion Report, 1974. 14 p, 7 fig, 1 tab, 3 ref. OWRT A-041-CONN(3). 14-31-0001-3708.

Descriptors: *Turbidity, *Estuaries, *Instrumentation, Water quality, Sediment transport, Suspended load, On-site data collections, Tidal effects, Connecticut River.
Identifiers: *Connecticut River estuary, Long Island Sound.

An investigation of the relationship between total turbidity and its component parts has been conducted within the Connecticut River estuary and adjacent Long Island Sound. Analyses of more than 200 drawn water samples obtained at a network of 11 stations over a period of 24 months have provided a detailed description of the spatial and temporal distribution of total suspended solids and the relative fraction of dissolved and suspended organic and inorganic constituents. These data have been correlated with bulk turbidity characteristics and selected water quality parameters including dissolved oxygen, biochemical oxygen demand and coliform bacteria counts. The correlations indicate that the relationship between turbidity and its component parts is complex and time variant. Individual constitutents vary as a function of season, freshwater discharge, wind stress and tidal state. The complexity precludes prediction of individual constitutents given total turbidity and therefore limits the utility of standard turbidity measurements with estuarine transport studies. In addition, the correlations reveal no simple relationship between turbidity and the selected water quality parameters. In this case the variability is the result of the high energy velocity field characteristic of the study area and the irregular fluctuations in sewage treatment procedures employed by the municipalities discharging wastes into the Connecticut River. The characteristics of the turbidity field have been used to establish the design criteria for instrumentation able to provide in situ measurements of suspended material concentrations. (de Lara-Connecticut)
W75-02881

THE ROLE OF SEA GRASSES AND BENTHIC ALGAE IN THE GEOCHEMISTRY OF TRACE METALS IN TEXAS ESTUARIES,
Texas Univ., Austin. Dept. of Botany.
For primary bibliographic entry see Field 5B.
W75-02894

CRITICAL STATE OF SALT-WATER UPCONING BENEATH ARTESIAN DISCHARGE WELLS,
Birmingham Univ. (England). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2F.
W75-02900

ON SEAWATER ENCROACHMENT IN COASTAL AQUIFERS,
State Univ. of New York, Buffalo. Faculty of Engineering and Applied Sciences.
C-H. Lee, and R. T-S. Cheng.
Water Resources Research, Vol 10, No 5, p 1039-1043, October 1974. 6 fig, 13 ref. OWRT C-4026(No 9006)(1). 14-31-0001-9006.

Descriptors: *Saline water intrusion, *Encroachment, *Mathematical models, Finite element analysis, Saline water, Saline water-freshwater interfaces, Dispersion, Equations, *Florida, Diffusion.
Identifiers: *Biscayne aquifer(Fla), Isochlors, Zone of diffusion.

The seawater encroachment in a coastal aquifer was studied by means of a mathematical model. In

some aquifers the dispersion amalgamates the encroaching seawater and the discharging freshwater to produce an extensive zone of diffusion. The coupled non-linear conservation equations of mass and of salt were formulated and solved by the finite element method with the aids of iteration and underrelaxation. The numerical procedure was verified by comparing solutions with known results in the literature. The seawater encroachment in the Biscayne aquifer at Cutler area, Florida, was modeled. The numerical results were in good qualitative agreement with the field data obtained by Kohout. (Gibb-ISWS)
W75-02901

DISTRIBUTION OF SOME HEAVY METALS IN ORGANISMS IN HARDANGERFJORD AND SKJERSTADFJORD, NORWAY,
Bristol Univ. (England). Dept. of Inorganic Chemistry.
For primary bibliographic entry see Field 5B.
W75-02923

LEGAL ASPECTS OF COASTAL ZONE MANAGEMENT IN THE FLORIDA KEYS,
For primary bibliographic entry see Field 6E.
W75-02942

A 50-MILE FISHERIES ZONE FOR OREGON.
Oregon Univ., Eugene. School of Law.
For primary bibliographic entry see Field 6E.
W75-02944

COMMENTS AND RECOMMENDATIONS OF THE SECRETARY OF COMMERCE ON THE FIRST ANNUAL REPORT OF THE NATIONAL ADVISORY COMMITTEE ON OCEANS AND ATMOSPHERE,
Department of Commerce, Washington, D.C. Office of the Secretary.
For primary bibliographic entry see Field 6E.
W75-02953

SHORELINE EROSION IN UPPER CHESAPEAKE BAY: THE ROLE OF GROUNDWATER,
Westinghouse Ocean Research Lab., Annapolis, Md.
H. D. Palmer.
Shore and Beach, Vol 41, No 2, p 19-22, October 1973. 8 fig, 10 ref.

Descriptors: *Shores, *Chesapeake Bay, *Erosion, *Waves(Water), *Groundwater, Currents(Water), Stability, Tides, Water table, Percolation, Recharge, Monitoring, Coasts, Porous media, Aquicludes, *Maryland.
Identifiers: *Spalling, *Shoreline recession, Littoral zone, Impermeable curtain.

The agents and processes responsible for shoreline erosion in the Chesapeake Bay area were reviewed and an important erosional mechanism which has apparently received scant attention in the literature of coastal erosion was described. For centuries, severe and destructive erosion has been recognized as a problem along the shorelines of Chesapeake Bay, but in spite of legislation to study factors affecting erosion and financial inducements encouraging waterfront property owners to adopt preventive measures, the situation became more critical with the passage of time. Some case histories of shore erosion in the Chesapeake Bay area were studied. Processes such as wind generated waves, currents, and variation in water levels did not account for shoreline erosion in some specific areas. It was indicated that groundwater played an important role in the erosional process at these locations. However, conditions that accelerate erosion were not identified. A monitoring and research program to study the effect of groundwater in the overall erosional process of the coastal shorelines of the Chesapeake Bay area was outlined. (Bhowmik-ISWS)
W75-03089

COASTAL ZONE BIBLIOGRAPHY (ANNOTATED).
Delaware State Planning Office, Dover.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-232 020, $4.75 in paper copy, $2.25 in microfiche. July 1973. 65 p, 2 fig.

Descriptors: *Bibliographies, *Coasts, Documentation, Information retrieval, *Publications, Data collections, Planning, Management, Maps, *Delaware.
Identifiers: *Coastal zone management.

This bibliography is part of a series of documents prepared for the Delaware Coastal Zone Management Study. Its purpose is to develop a data bank readily available to the State Planning Office and others concerned with Coastal Zone planning and management. The collection, organization, and evaluation of information on the natural and manmade resources of the Coastal Zone is essential to the development of a comprehensive management plan for the Coastal Zone and for administrative decisions under the Coastal Zone Act. The bibliography is a selected listing of materials which would be of value to planners and others concerned with the broader levels of Coastal Zone management. It includes descriptive statements for those materials of special interest as resource documents. The bibliography is organized on a major category or subject basis and is divided into three parts: (1) reference documents, (2) selected map and photographic references, and (3) selected list of source agencies. These categories represent major resource groupings and the materials were assigned to each category based on their major subject content. Each listing includes one or more references indicating where the material may be obtained. (Scott-ISWS)
W75-03109

OCEAN ENGINEERING AND OCEANOGRAPHY TECHNICAL LITERATURE COLLECTION, WATER RESOURCES CENTER ARCHIVES,
California Univ., Berkeley. Hydraulic Engineering Lab.
M. Poniatowski.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-11260, $7.00 in paper copy, $2.25 in microfiche. Hydraulic Engineering Laboratory 26-1, April 1974. 194 p. NOAA 04-3-158-22.

Descriptors: *Bibliographies, *Oceanography, Information retrieval, Technical writing, Documentation, Information exchange, *Publications, Indexing, *California, Coastal engineering.
Identifiers: *Ocean engineering.

A portion of a collection of materials on ocean engineering and oceanography housed at the Water Resources Center Archives, University of California, Berkeley was cataloged. The entire collection consists of approximately 20,000 titles; 1496 selected titles are presented. These reports and reprints were collected over the last twenty-five years as a byproduct of research activities in this field. Author and subject indexes are provided. The purpose of this compilation was to provide industries, government agencies, and academic interests with ready access to centrally concentrated data on available relevant reports and documents. Photoprints of titles in this compilation are available as rapid copies. (Scott-ISWS)
W75-03113

1971 NEHALEM RIVER ESTUARY RESOURCE USE STUDY,
Oregon Fish Commission, Salem. Div. of Management and Research.
For primary bibliographic entry see Field 6C.
W75-03122

THE DELINEATION OF AND FACTORS AFFECTING MISSISSIPPI COASTAL ESTUARIES AND TIDAL MARSHES,
Mississippi Univ., University. Dept. of Urban and Regional Planning.
For primary bibliographic entry see Field 5G.
W75-03124

REVIEW OF THE RESULTS FROM THE EASTERN ATLANTIC CONTINENTAL MARGIN PROGRAM OF THE INTERNATIONAL DECADE OF OCEAN EXPLORATION,
Woods Hole Oceanographic Institution, Mass.
K. O. Emery.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-225 036/3, $3.75 in paper copy, $2.25 in microfiche. Report WHOI-73-75, October 1973. 34 p, 10 fig, 13 ref. NSF GX-28193.

Descriptors: *Oceanography, *Oceans, *Exploration, Ocean circulation, Hydrologic aspects, Oil fields, Petroleum, International waters, Atlantic Ocean, Marine fisheries, Africa, Marine geology, Continental margin, Structural geology.
Identifiers: Offshore oil prospects, Salt domes, Potential fisheries, Salt diapiric structures, Mineral deposits.

One of the programs of the International Decade of Ocean Exploration is a large geophysical and geological study of the Eastern Atlantic Continental Margin. The program was developed to determine (1) the date and manner by which Africa became separated from South and North America; (2) the subsequent history and development of the continental margin and the adjacent deep-sea floor; and (3) location of possible economic coastal mineral deposits. The four-year study began with nine months devoted to the assembly of background information and construction of a new geophysical system utilizing shipboard computers. Cruises during the first halves of 1972 and 1973 were spent mainly between Port Elizabeth and the Congo River and the Congo and Lisbon respectively. Results obtained include continuous seismic reflection profiles, gravity, total magnetic field, temperature, salinity, color, suspended sediments, chlorophyll content, phytoplankton in the surface water, wind and wave measurements, approximate currents and counts of sea birds and of larger plankton and nekton. The cruises also mapped sediment-filled basins and belts of salt diapiric structures representing potential or existing sites for petroleum production. Some pagoda structures promising sources for natural gas were also discovered. Existing and future fishing areas were also noted. (Schroeder-Wisconsin)
W75-03139

1971 COQUILLE RIVER ESTUARY RESOURCE USE STUDY,
Oregon Fish Commission, Salem. Div. of Management and Research.
For primary bibliographic entry see Field 6C.
W75-03143

1971 NESTUCCA RIVER ESTUARY RESOURCE USE STUDY,
Oregon Fish Commission, Salem. Div. of Management and Research.
For primary bibliographic entry see Field 6C.
W75-03144

SEAWATER INTRUSION, GROUND-WATER PUMPAGE, GROUND-WATER YIELD, AND ARTIFICIAL RECHARGE OF THE PAJARO VALLEY AREA, SANTA CRUZ AND MONTEREY COUNTIES, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 5B.
W75-03154

YUKON RIVER SEDIMENT ON THE NORTHERNMOST BERING SEA SHELF,
Washington Univ., Seattle. Dept. of Oceanography.
D. A. McManus, K. Venkatarathnam, D. M. Hopkins, and C. H. Nelson.
Journal of Sedimentary Petrology, Vol 44, No 4, p 1052-1060, December 1974. 3 fig, 4 tab, 21 ref. USGS Contracts 14-08-0001-10924 and 14-08-0001-11995.

Descriptors: *Sedimentation, *Sediment distribution, *Alaska, Sediment transport, Distribution patterns, Bottom sediments, Arctic, Sediment discharge, Sands, Provenance.
Identifiers: *Bering Sea, *Yukon River, *Chukchi Sea.

Although very fine-grained sands and silts are deposited seaward of the delta of the Yukon River, sediment derived from the Yukon is a more dominant component of bottom sediments in the Chukchi Sea than in the Bering Sea where the river debouches. Between the area of the delta and the Chukchi Sea is the Chirikov Basin, which is floored by relict sands and has a pattern of bottom topography leading into the Chukchi Sea that suggests a former route of the Yukon. However, the Holocene Yukon sand has not reached the Chirikov Basin. Only after the opening of Shpanberg Strait approximately 11,800 B.P. did Yukon-derived sediment enter the northernmost Bering Sea. From 11,800 to 5,000 B.P. fine-grained sand was carried onto Norton Plain by the recently strengthened coastal current. This sand is now relict. Since about 5,000 B.P. the modern Yukon very fine sand and silt have been accumulating near the delta. The opening of Shpanberg Strait may represent a more marked change in the sedimentary history of the adjacent parts of the Bering and Chukchi Seas than does the earlier opening of Bering Strait and the Strait of Anadyr that formed the initial connection of the seas. (Knapp-USGS)
W75-03160

PP'-DDT ADSORPTION TO SUSPENDED PARTICULATE MATTER IN SEA WATER,
Rhode Island Univ., Kingston. Dept. of Food and Resource Chemistry.
For primary bibliographic entry see Field 5B.
W75-03174

MARINE STUDIES OF SAN PEDRO BAY, CALIFORNIA. PART VII. SEDIMENT COMPOSITIONS IN LOS ANGELES-LONG BEACH HARBORS AND SAN PEDRO BASIN,
University of Southern California, Los Angeles. Environmental Engineering.
For primary bibliographic entry see Field 5B.
W75-03176

SCOUR AND DEPOSITION--CHANGES IN SEDIMENTATION AROUND A NUCLEAR POWER PLANT,
Wisconsin Univ., Madison. Geo-Environmental and Mineral Resources Program.
For primary bibliographic entry see Field 2J.
W75-03178

SEDIMENTARY STRUCTURES OF A MODERN LAGOONAL ENVIRONMENT: PAMLICO SOUND, NORTH CAROLINA,
North Carolina Univ., Chapel Hill. Dept. of Geology.
For primary bibliographic entry see Field 8B.
W75-03180

INFLUENCE OF SEDIMENTARY PROCESSES ON GRAIN SIZE DISTRIBUTION CURVES OF BOTTOM SEDIMENTS IN THE SOUNDS AND ESTUARIES OF NORTH CAROLINA,
North Carolina Univ., Chapel Hill. Dept. of Geology.
E. S. Custer, Jr., and R. L. Ingram.
Sea Grant Publication UNC-SG-74-13, August 1974. 88 p, 36 fig, 38 ref. NOAA 04-3-158-40.

Descriptors: *North Carolina, *Estuaries, *Sediment transport, *Currents(Water), *Waves(Water), Sedimentation, Suspension, Traction, Saltation.
Identifiers: Grain size, Wave action, *Pamlico Sound(NC), Sea Grant Program.

Analysis of 142 sediment samples from Pamlico Sound and associated estuaries indicates that grain size distributions reflect: (1) the proportion of sediment transported by suspension, traction, and saltation; (2) the grain size limits for each population; and (3) the type of energy source, waves or currents. Sediment finer than 3.3 phi was transported in suspension. Sediments ranging in grain size from 3.3 phi to 1.5 phi were transported by saltation. Sediments between 1.5 phi and 0.8 phi were transported either by saltation or traction. Sediments coarser than 0.8 phi were usually transported as the traction load. The sorting of the saltation populations, the coarseness of the saltation-traction truncation point and the amount of suspension material are indicative of the energy source. Wave action is indicated by the presence of well sorted saltation populations. Current action is indicated by less well sorted to moderately sorted saltation populations. (NOAA)
W75-03181

LOUISIANA SUPERPORT STUDIES. REPORT 3. RECOMMENDATIONS FOR THE ENVIRONMENTAL PROTECTION PLAN,
Louisiana State Univ., Baton Rouge. Center for Wetlands Resources.
For primary bibliographic entry see Field 6G.
W75-03183

ENTERIC BACTERIOPHAGES IN SAINT LOUIS BAY, MISSISSIPPI,
Mississippi Univ., University. Dept. of Biology.
For primary bibliographic entry see Field 5B.
W75-03185

THE MARINE ENVIRONMENT--USE AND ABUSE, ORDER OR CONFLICT--PART 1,
Aquamarine International Ltd., London (England).
For primary bibliographic entry see Field 5G.
W75-03198

INTERNATIONAL JOURNAL OF MEDICAL OCEANOGRAPHY SUPPLEMENT. MARINE POLLUTIONS AND SHORELINE MANAGEMENT,
For primary bibliographic entry see Field 5B.
W75-03207

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

WASTEWATER RECLAMATION AND REUSE IN ISRAEL,
Technion - Israel Inst. of Tech., Haifa (Israel).
For primary bibliographic entry see Field 5D.
W75-02779

METHODS AND MEANS FOR DISTILLATION OF LIQUIDS,
Nordnero A.B., Goteborg (Sweden). (assignee)
C. O. Fredriksson.
U. S. Patent No 3,833,479, 3 p, 2 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 926, No 1, p 205, September 3, 1974.

Descriptors: *Patents, *Distillation, *Evaporation, *Condensation, *Waste water treatment, Heat exchangers, Equipment.

A method for distillation of liquids comprises the use of two separate liquid circulation systems. The liquid of the first system passes from a tank through a heat exchanger and is then brought to an evaporator where it meets a counter running colder gas flow before being returned to the tank. The liquid of the second system passes a condenser after which it meets the same counter running gas flow. The gas flow which has become heated from the first liquid heats the second liquid and thus emits heat to the heat exchanger. (Sinha-OEIS)
W75-02847

DISTILLATION OF LIQUID SOLUTIONS EXPANDED ALONG A CURVILINEAR SURFACE,
Compagnie Electro-Mecanique, Paris (France). (assignee)
R. Bidard.
U. S. Patent No 3,833,480, 5 p, 9 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 926, No 1, p 205, September 3, 1974.

Descriptors: *Patents, *Distillation, *Desalination, *Waste water treatment, Sea water, Potable water, Equipment.

A method of distillation of a liquid, especially sea water, involves several stages each of which has at least one cell through which the liquid flows and in which steam produced by evaporation is separated from the unevaporated liquid in order to obtain a condensate. Each stage operates according to a thermodynamic cycle which comprises the steps of heating the impure liquid and passing the heated liquid through an expansion zone at one end of the inside of a curvilinear surface for expansion of at least a portion of the heated liquid to obtain a mixture of impure liquid and vapor. The vapor is condensed to obtain pure liquid. The unevaporated liquid is passed through a diffusor zone to reduce its velocity while increasing its pressure, reheating at least a portion of the unevaporated liquid and repeating the cycle. (Sinha-OEIS)
W75-02848

MULTI-STAGE EVAPORATOR,
K. D. Peter.
U. S. Patent No 3,834,994. 3 p, 4 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 926, No 2, p 597, September 10, 1974.

Descriptors: *Patents, *Evaporation, *Condensation, *Waste water treatment, *Desalination, *Distillation, Sea water, Potable water, Water purification, Equipment.

An evaporator has a plurality of evaporating chambers which have a pressure and temperature drop with regard to each other and which are equipped with devices for conveying a liquid through the evaporating chambers. A portion of the liquid is evaporated in each chamber while condensers are provided each of which communicates with one of the evaporating chambers. The evaporator furthermore comprises means for removing the obtained distillate from the condensers, and is also equipped with withdrawing devices such as suction devices for removing the inert gases from the evaporator. With large scale plants, for withdrawing inert gases from the evaporator, primarily two and multi-stage steam jet ejectors are employed while each stage of the steam jet ejector is followed by a condenser for condensing the motive steam and the quantity of steam which hangs onto the inert gases. (Sinha-OEIS)
W75-02851

WATER FACTORY 21,
Orange County Water District, Fountain Valley, Calif. Board of Directors.

For primary bibliographic entry see Field 5D.
W75-02874

METHOD AND APPARATUS FOR REMOVING WATER SOLUBLE WASTES OR SALTS FROM AN AQUEOUS SOLUTION,
L. J. Wallace.
US Patent No 3,833,044, 7 p, 4 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 926, No 1, p 98, September 3, 1974.

Descriptors: *Patents, *Desalination, *Evaporation, *Condensation, *Industrial wastes, Water quality control, Water pollution control, Pollution abatement, Screens, *Waste water treatment, *Salts, *Liquid wastes.
Identifiers: Sodium nitrite, Potassium nitrate.

A stream of air is passed through a movable, porous, expendible curtain or screen which has been previously saturated by drawing it through a supply of aqueous salt solution. Unsaturated air directed through the porous curtain effects evaporation of the water leaving the salt crystals embedded in the curtain, which is being progressively rolled upon a reel for subsequent disposal. The air in passing through the curtain becomes saturated and may be either vented to the atmosphere or may be directed into heat transfer relationship to a condenser. The moisture content is condensed and the air recirculated. (Sinha-OEIS)
W75-02932

SEPARATION OF FRESH WATER FROM AQUEOUS SOLUTIONS BY DIRECT CONTACT HEAT EXCHANGE,
S-W. Cheng, and C-Y. Cheng.
US Patent No 3,830,075, 5 p, 6 ref; Official Gazette of the United States Patent Office, Vol 925, No 3, p 790, August 20, 1974.

Descriptors: *Patents, *Desalination, *Water treatment, Fresh water, Freezing, Ice, *Separation techniques, Aqueous solution.
Identifiers: *Heat exchange.

The process consists of effecting rectification of an aqueous solution into relatively rich and lean portions by a first step of partially freezing the aqueous solution by removal of heat energy to form ice, a second step of separating the ice from the mother liquor, and a third step of melting the separated ice by the addition of heat energy so that the mother liquor and the melted ice respectively constitute the relatively rich and lean portions. The first step is conducted by maintaining a heat exchange relation between the aqueous solution and an at least partially frozen material while also maintaining such material under a pressure such that the prevailing liquid-solid transition temperature is less than the currently prevailing freezing temperature of the aqueous solution to thereby melt at least a portion of the material and freeze ice from the aqueous solution. The third step is conducted by maintaining a heat exchange relation between the separated ice and an at least partly melted material while also maintaining the latter under a pressure such that the prevailing liquid-solid transition temperature is higher than the currently prevailing liquid-solid transition temperature of the separated ice to thereby freeze at least a portion of the material and melt at least a portion of the ice. (Sinha-OEIS)
W75-02934

3B. Water Yield Improvement

HYDROCHEMICAL INVESTIGATIONS OF THE CENTRAL KENTUCKY KARST AQUIFER SYSTEM,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
J. W. Hess.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-238 366, $7.50 in paper copy, $2.25 in microfiche. Ph D Thesis, Dept of Geology, August 1974. 219 p, 21 tab, 62 fig, 81 ref, 3 append. OWRT B-046-PA(2). 14-31-0001-3638.

Descriptors: *Water yield improvement, Groundwater, *Hydrogeology, *Aquifers, *Catchments, *Water table, *Water quality, *Baseflow, Storms, Sinkhole, Porosity, Permeability, Evapotranspiration, Runoff, *Kentucky, Indiana, Tennessee.
Identifiers: *Hydrochemical response, *Groundwater storage.

The hydrochemical and aquifer response of a mature karst aquifer was studied to gain a better understanding of the groundwater flow mechanisms and groundwater storage. the study included: (1) hydrogeology of the area, (2) physical hydrology of the aquifer system, (3) carbonate chemistry of the water, and (4) investigating the aquifer response to storms as a new technique of aquifer characterization. The Central Kentucky Karst represents a principal type of karst terrain in North America. There are four types of catchments plus river back flooding recharging the basal springs; sinking streams, sinkhole areas, perched aquifers, and karst valleys. The aquifer has both a significant secondary porosity and permeability from fractures and bedding planes and a significant tertiary permeability. The water table has a relatively high gradient of 9.9 m/km under the Sinkhole Plain where its shape is determined by shale layers. The evapotranspiration losses for the Central Kentucky Karst are 14% lower than that for the entire Green River Basin. The coefficients of variation for the various chemical parameters tend to decrease downstream. Storms of high intensity and short duration were useful probes of an aquifer system. Chemical hydrographs of specific storm events show changes in water quality.
W75-02891

THE MIXING OF RAIN WITH NEAR-SURFACE WATER,
Wisconsin Univ., Madison. Dept. of Meteorology, and Wisconsin Univ., Madison. Civil and Environmental Engineering.
For primary bibliographic entry see Field 2B.
W75-02897

COMMENTS AND RECOMMENDATIONS OF THE SECRETARY OF COMMERCE ON THE FIRST ANNUAL REPOkT OF THE NATIONAL ADVISORY COMMITTEE ON OCEANS AND ATMOSPHERE,
Department of Commerce, Washington, D.C. Office of the Secretary.
For primary bibliographic entry see Field 6E.
W75-02953

GILA RIVER CHANNEL IMPROVEMENTS BETWEEN CAMELSBACK RESERVOIR SITE AND SALT RIVER ARIZONA (UPPER END OF SAFFORD VALLEY BETWEEN THE BROWN CANAL, ETC....) (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Los Angeles, Calif.
Available from National Technical Information Service, Springfield, Va 22161, U.S. Dept. of Commerce as EIS-AZ-73-0415-F, $5.25 in paper copy, $2.25 in microfiche. March 1973. 115 p, 12 fig, 2 tab.

Descriptors: *Environmental effects, *Clogging, *Phreatophytes, *Stream improvement, *Arizona, Southwest US, Channel flow, Channel improvement, Streamflow, Flood control, Flood protection, Water management(Applied), Water law, Wildlife habitats, Riparian plants, Nesting cover, Birds, Tamarisk, Saline soil, Federal government, Governmental interrelations, Wildlife conservation, Environmental effects.
Identifiers: *Environmental impact statement, *National Environmental Policy Act, *Navigation obstructions.

This project consists of removing phreatophytes (mostly saltcedar) from 3,050 acres of the Gila River, at the upper end of Safford Valley between Brown Canal Heading and the San Carlos Indian Reservation in Arizona. Construction of the project began in May 1970, but less than a month later a temporary injunction was obtained in federal court by several environmental groups, halting the project until an environmental statement was prepared. The clearing of the channel will eliminate the frequent flooding caused by the dense phreatophyte growth which restricts the flow capacity of the river. The removal of the phreatophytes will also eliminate some wildlife habitat, particularly nesting sites for local bird species. The original plan called for removal of 5,020 acres, however, the present proposal represents a compromise between the need for flood protection and an effort to minimize the adverse environmental effects of the flood protection and an effort to minimize the adverse environmental effects of the project. While clearing the river will enhance the economic development of the region, there is still considerable opposition to the project due to its adverse effect on local wildlife habitat. (Deckert-Florida)
W75-02972

BIOLOGICAL EFFECTS IN THE HYDROLOGICAL CYCLE,
For primary bibliographic entry see Field 2A.
W75-03023

EVALUATING THE EFFECTS OF WATER YIELD MANAGEMENT,
Arizona Univ., Tucson. Dept. of Watershed Management.
M. M. Fogel.
In: Biological Effects In The Hydrological Cycle, Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana. p 303-314, 3 fig, 2 tab, 31 ref.

Descriptors: *Hydrologic cycle, *Watershed management, *Water management(Applied), *Model studies, Water yield improvement, Land management, Water yield, Water supply, Surface runoff, Watersheds(Basins), River basin development, Water conservation, Forest management, *Southwest US, Streamflow.

Research dealing with the management of watersheds for water production was reviewed, particularly research applicable to conditions in the southwestern United States. A methodology was suggested for evaluating water yield improvement practices in light of the entire water supply, storage, and delivery system. The procedure consists of utilizing a time series of precipitation to account for the variable nature of the input to the hydrologic system. Then, a watershed model is required that relates inputs to the hydrologic products of a watershed, water and sediment, for a given set of site conditions. The procedure includes an analysis that considers the entire system in a manner that allows consumer benefits to be realistically determined. (See also W75-03023) (Jess-ISWS)
W75-03037

VEGETATIVE MANAGEMENT AND WATER YIELD RELATIONSHIPS,
California Univ., Davis. Dept. of Water Science and Engineering.
R. H. Burgy, and Z. G. Papazafiriou.
In: Biological Effects In The Hydrological Cycle, Proceedings of the Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana. p 315-331, 9 fig, 1 tab, 25 ref.

Descriptors: *Vegetation effects, *Water yield, Hydrologic cycle, Rainfall-runoff relationships, Watersheds(Basins), Small watersheds, Agricultural watersheds, Hydrology, Hydrographs, Demonstration watersheds, Management, *California, Erosion, Slope stability.

Watersheds respond to precipitation to produce runoff in quantities influenced by many factors, the vegetative cover being particularly important. The three subject areas presented were: (1) a review of the methods usually employed for quantitative evaluation of hydrologic responses of watersheds subjected to vegetative management; (2) results obtained from experimental watersheds in California; and (3) some aspects related to soil erosion and stability observed on one geologic complex. Vegetation is related to the runoff cycle through evapotranspiration and interception and both processes are direct functions of the type and density of vegetation. Results of case studies showed: the response of watersheds to interception reduction is rapid and can be clearly visualized by storm hydrography analysis; the seasonal distribution of precipitation is an important factor affecting the total annual water yield; and estimated average increases in water yields after vegetation management range from 50 to 80% in Central and Northern California. (See also W75-03023) (Humphreys-ISWS)
W75-03038

EFFECTS OF SILVER FROM CLOUD SEEDING ON MICROFLORA OF ANIMAL DIGESTIVE SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Fishery and Wildlife Biology.
For primary bibliographic entry see Field 5C.
W75-03134

MEKY RIVER DIVERSION SCHEME,
Awash Valley Authority, Addis Ababa (Ethiopia).
L. Gusberti, and A. Tamburrino.
L'Energia Elettrica, Vol 50, No 11, p 678-684, November, 1973.

Descriptors: *River basins, *Reservoirs, Mathematical studies, Hydrology, *Diversion loss returns, Pumping, Dams, Seepage, Evaporation control.
Identifiers: *Lake Ziway(Ethiopia), Galla Lakes, *Ethiopia.

Provisions for the diversion of about 200 million cu m of water per year from the Galla Lakes basin to the reservoir created by the Koka Dam are described. This compensates, in part, for the seepage losses from the reservoir, estimated at around 400 million cu m per year. Alternatives, with their mathematical calculations were studied. The selected solution involves the pumping of the waters to be diverted from Lake Ziway. By lowering the mean level of this lake by some two meters, through removal of a rock sill at its outlet end, evaporation will be reduced by the same amount as the volume to be diverted. (Prague-FIRL)
W75-03195

3C. Use Of Water Of Impaired Quality

THE RELATION OF IRRIGATION RETURN-FLOWS TO WATER CHEMISTRY AND PERIPHYTON IN THE LEMHI RIVER, IDAHO,
Idaho Univ., Moscow. Coll. of Forestry, Wildlife and Range Sciences.
For primary bibliographic entry see Field 5B.
W75-02980

RENOVATION OF MUNICIPAL WASTE-WATER THROUGH FOREST IRRIGATION,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 5D.
W75-03035

RENOVATING SEWAGE EFFLUENT BY GROUND WATER RECHARGE,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 5D.
W75-03036

IMPACTS OF COLORADO RIVER SALINITY,
Colorado River Board of California, Los Angeles.
For primary bibliographic entry see Field 5C.
W75-03102

IRRIGATION OF CITRUS WITH CITRUS PROCESSING WASTE WATER,
Agricultural Research and Education Center, Lake Alfred, Fla.
For primary bibliographic entry see Field 5D.
W75-03274

3D. Conservation In Domestic and Municipal Use

WATER FOR TOMORROW'S CITIES: POLICY VARIABLES IN RESIDENTIAL WATER RESOURCES MANAGEMENT,
Toronto Univ. (Ontario). Dept. of Geography.
A. P. Grima.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 14-26. 38 ref.

Descriptors: Water resources, *Water management(Applied), *Water allocation(Policy), Water resources development, Water use, Water rates, Water costs, Water pressure, Taste, Color, Hardness(Water), Dependable supply, Climates, Income, Equations, Management, Planning, United States, Urbanization, Rural areas, Industries, Water supply, Measurement.

The increasing pressure to allocate scarce resources to provide municipal water as a result of increasing urban population and rising costs was discussed. A change in emphasis was suggested from the traditional 'requirements' approach in forecasting and planning towards a more comprehensive approach. In order to justify such a change in management strategy, it was necessary to demonstrate that water use is functionally related to a number of factors (e.g., climate, price to consumer, metering, and income level) some of which are under the control of management. Recent progress in this field was reviewed and a number of policy variables and their likely effect on residential water demand were discussed. The policy implications of this evidence for the water supply utility industry were briefly examined. A framework for planning a residential water supply was also presented. (See also W75-02751) (Dawes-ISWS)
W75-02753

PRICE AND OTHER SELECTED ECONOMIC AND SOCIO-ECONOMIC FACTORS AS DETERMINANTS OF HOUSEHOLD WATER CONSUMPTION,
Mississippi Univ., University. Dept. of Economics.
For primary bibliographic entry see Field 6B.
W75-02767

WATER SUPPLY AND SEWER SYSTEM FOR THE CITY OF CHICAGO,
Chicago Dept. of Water and Sewers, Ill.
For primary bibliographic entry see Field 5F.
W75-02783

OPTIMAL ALLOCATION OF WATER QUALITY CONTROLS IN URBANIZING RIVER BASINS,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5G.
W75-02908

LEGAL RESPONSIBILITIES FOR SEWAGE DISPOSAL IN AN URBAN COUNTY,
Ohio Dept. of Health, Columbus. Office of Planning.
For primary bibliographic entry see Field 5G.
W75-02936

POLLUTION ABATEMENT THROUGH SEWER SYSTEM CONTROL,
Dayton Dept. of Water, Ohio.
For primary bibliographic entry see Field 5D.
W75-02955

WATER QUALITY FOR POTABLE REUSE OF WASTEWATER,
Dallas Water Reclamation Research Center, Tex.
For primary bibliographic entry see Field 5D.
W75-03008

DEMONSTRATION OF WASTE FLOW REDUCTION FROM HOUSEHOLDS,
General Dynamics Corp., Groton, Conn. Electric Boat Div.
For primary bibliographic entry see Field 5D.
W75-03021

THE INTEGRATED MULTI-MEDIA POLLUTION MODEL,
Georgetown Univ., Washington, D.C. Dept. of Economics.
For primary bibliographic entry see Field 5B.
W75-03045

DEVELOPMENT OF A MONTHLY MUNICIPAL TECHNOLOGY BULLETIN,
Franklin Inst. Research Labs., Philadelphia, Pa.
For primary bibliographic entry see Field 5D.
W75-03051

REGIONAL GOVERNMENTAL ARRANGEMENTS IN METROPOLITAN AREAS: NINE CASE STUDIES,
Institute for Community Studies, Kansas City, Mo.
For primary bibliographic entry see Field 6E.
W75-03053

HYDROLOGY OF POROUS PAVEMENT PARKING LOTS,
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W75-03098

3E. Conservation In Industry

INDUSTRY STEPS IN TO SAVE THE LAND.
For primary bibliographic entry see Field 6E.
W75-02954

CATALYZED BIO-OXIDATION AND TERTIARY TREATMENT OF INTEGRATED TEXTILE WASTEWATERS,
Fram Corp., Providence, R.I.
For primary bibliographic entry see Field 5D.
W75-03049

SUBMERGED COMBUSTION EVAPORATOR FOR CONCENTRATION OF BREWERY SPENT GRAIN LIQUOR,
Anheuser-Busch, Inc., St. Louis, Mo. Engineering Dept.
For primary bibliographic entry see Field 5D.
W75-03050

COMPETITIVE BINDING OF MERCURIC CHLORIDE IN DILUTE SOLUTIONS BY WOOL AND POLYETHYLENE OR GLASS CONTAINERS,
Western Regional Research Lab., Berkeley, Calif.
For primary bibliographic entry see Field 5B.
W75-03058

CUTTING WIRE-MILL POLLUTION,
For primary bibliographic entry see Field 5D.
W75-03073

SPECTROPHOTOMETRIC DETERMINATION OF PETN IN WASTE WATER FROM LEAD STYPHNATE PRIMER PLANTS,
Frankford Arsenal, Philadelphia, Pa.
For primary bibliographic entry see Field 5A.
W75-03081

SIMULATION OF MINIMUM ENVIRONMENTAL AND ECONOMIC DISPATCH OF POWER,
National Center for Energy Management and Power, Philadelphia, Pa.
For primary bibliographic entry see Field 5G.
W75-03127

RAW MATERIALS TRANSPORTATION COSTS AND THEIR INFLUENCE ON THE USE OF WASTEPAPER AND SCRAP IRON AND STEEL, VOLUME II, APPENDICES,
Resource Planning Inst., Cambridge, Mass.
For primary bibliographic entry see Field 5G.
W75-03299

3F. Conservation In Agriculture

WATER-RESOURCES DATA COLLECTED IN THE DEVILS HOLE AREA, NEVADA, 1972-1973,
Geological Survey, Las Vegas, Nev.
For primary bibliographic entry see Field 7C.
W75-02797

COSTS AND RETURNS FROM CROPS AND LIVESTOCK IN THE UPLAND DESERT VALLEYS OF NEVADA,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 4A.
W75-02898

PHYSICAL AND ECONOMICAL ASPECTS OF CONJUNCTIVE USE OF IRRIGATION WATER IN SMITH VALLEY, LYON COUNTY, NEVADA,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 4B.
W75-02899

RECLAMATION WATER RIGHTS,
Wyoming Univ., Laramie.
For primary bibliographic entry see Field 6E.
W75-02943

WATER, WATER FOR THE WEALTHY,
For primary bibliographic entry see Field 6E.
W75-02951

LAND DISPOSAL OF WASTEWATER WITH SPRAY IRRIGATION BY SMALL MICHIGAN MUNICIPALITIES - AGRICULTURAL, INSTITUTIONAL, AND FINANCIAL CHARACTERISTICS,
Michigan State Univ., East Lansing. Dept. of Agricultural Economics; and Michigan State Univ., East Lansing. Dept. of Resources Development.
For primary bibliographic entry see Field 5D.
W75-02982

SAN LUIS UNIT TECHNICAL RECORD OF DESIGN AND CONSTRUCTION: VOLUME IV. DESIGN, DOS AMIGOS PUMPING PLANT, PLEASANT VALLEY PUMPING PLANT,
Bureau of Reclamation, Denver, Colo.
For primary bibliographic entry see Field 8C.
W75-03005

ESTIMATION OF POTENTIAL AND CROP EVAPOTRANSPIRATION,
Utah State Univ., Logan. Dept. of Agricultural and Irrigation Engineering.
For primary bibliographic entry see Field 2D.
W75-03090

PHYSICAL AND CHEMICAL QUALITY OF AGRICULTURAL LAND RUNOFF,
South Dakota School of Mines and Technology, Rapid City.
For primary bibliographic entry see Field 5B.
W75-03091

A MATHEMATICAL SIMULATION MODEL FOR THE MOVEMENT OF WATER AND NITRATE IN THE SOIL PROFILE,
Illinois Univ., Urbana. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W75-03119

EFFECT OF WATERLOGGING ON THE GROWTH OF ANNUAL MEDICAGO SPECIES,
Western Australian Dept. of Agriculture, South Perth.
C. M. Francis, and M. L. Poole.
Aust J Exp Agric Anim Husb, Vol 13, No 65, p 711-713, 1973.

Descriptors: *Alfalfa, Irrigation effects, Water supply, *Saturated soils.
Identifiers: *Medicago spp, Medicago-arabica, Medicago-intertexta, Medicago-littoralis, Medicago-minima, Medicago-orbicularis, Medicago-polymorpha, Medicago-scutellata, Medicago-tornata, Medicago-truncatula, Trifolium-subterraneum, *Waterlogging.

Nine annual Medicago species, including several lines of each, and 3 cultivars of Trifolium subterraneum were tested for sensitivity to waterlogging in a glasshouse experiment. The Medicago species were generally more sensitive to waterlogging than T. subterraneum, but there were large differences between species, and in some instances between lines of the one species. The most tolerant species were M. polymorpha, M. arabica and M. intertexta. The most sensitive were M. scutellata, M. tornata and M. minima. (The other Medicago species were M. littoralis, M. orbicularis and M. truncatula.)--Copyright 1974, Biological Abstracts, Inc.
W75-03135

RAILROADS, IRRIGATION, AND ECONOMIC GROWTH: THE SAN JOAQUIN VALLEY OF CALIFORNIA,
California State Univ., Fresno.
For primary bibliographic entry see Field 6B.
W75-03150

HYDROGEOLOGIC CHARACTERIZATION OF CALMATUI-GROPENI DAM ENCLOSURE, (IN RUMANIAN),
Institutul de Studii si Cercetari Pedologie, Bucharest (Rumania).
For primary bibliographic entry see Field 4A.
W75-03192

SIMPLE SOIL WATER SIMULATION MODEL FOR ASSESSING THE IRRIGATION REQUIREMENTS OF CITRUS,
Volcani Inst. of Agricultural Research, Bet-Dagan (Israel). Div. of Agricultural Meteorology.
L. Lewin.
Isr J Agric Res, Vol 23, No 1, p 3-12, 1973, Illus.

Descriptors: Irrigation, *Irrigation practices, Asia, *Irrigation systems, Soil water, Moisture content, Irrigation operation and maintenance, *Model studies.
Identifiers: *Israel.

A regression model was used to simulate changes in the soil water content of citrus orchards at 2 sites in Israel. The model explained almost 90% of the variation in the soil water content of an orchard in the northern Negev, and 80% of the variation in an orchard in the central coastal plain. The use of such a model in irrigation management is discussed, and the use of a simplified general equation relating soil water deficit to previous precipitation is proposed for general application.--Copyright 1974, Biological Abstracts, Inc.
W75-03228

EFFECT OF NUTRITION AND IRRIGATION ON RADISH SEED PRODUCTION,
Haryana Agricultural Univ., Hissar (India).
K. Singh, and G. S. Cheema.
Indian J Hortic, Vol 29, No 3/4, p 330-333, 1972.
Identifiers: *Irrigation, Nutrition, *Radish seed production, Soil moisture, Water consumption, *India(Ludhiana), Soil treatment, *Nitrogen, *Phosphorus, *Fertilization.

A factorial experiment was conducted at Ludhiana, India in 1967-68 on the seed production of radish. Treatments consisting of 3 levels of irrigation (30, 45 and 60% moisture depletion), 2 levels of N (100 and 200 kg/ha), and 2 levels of P (50 and 100 kg/ha) were arranged in a randomized block design with 3 replications. The planting material consisted of roots of the cultivar 'White-5.' Medium level of irrigation induced earlier flowering. Different levels of N and P did not have significant effect individually. A high dose of N (200 kg/ha) and frequent irrigation (30% moisture depletion) delayed maturity of the seed crop. A high level of P (100 kg/ha) and an increasing interval of irrigation brought early maturity of seed. Radish seed yield increased with more supply of water through irrigation and higher dose of N. The consumptive use of water for radish seed production was 54.40 cm/ha. It required irrigation after 30% moisture depletion from the soil.--Copyright 1974., Biological Abstracts, Inc.
W75-03255

CONTROL OF CITRUS NEMATODE, TYLENCHULUS SEMIPENETRANS COBB, BY DBCP APPLICATION IN IRRIGATION WATER,
Punjab Agricultural Univ., Ludhiana, (India). Dept. of Zoology-Entomology.
O. S. Bindra, and H. K. Chhabra.
Indian J Hortic, Vol 29, No 3/4, p 302-306, 1972.
Identifiers: Citrus, Irrigation water, *Nematodes(Citrus), *Orange trees, Tylenchulus-semipenetrans, Chemcontrol, Biocontrol, *Soil treatment, Propane compounds.

Three doses of DBCP (1,2-dibromo-3-chloropropane) (Nemagon) (37,74 and 148 kg/ha) applied to the soil in the basin in irrigation water for the control of T. semipenetrans on 18-yr-old

sweet orange trees in sandy-loam soil resulted in complete decimation of the larvae within 1 mo. and of the adult females within 5 mo. The population of this nematode did not build up during the following 16 mo. The treatments also resulted in 100-200% increase in fruit yield.--Copyright 1974, Biological Abstracts, Inc.
W75-03259

DEPTH EFFECTS AND GENETIC INFLUENCES ON INJURY CAUSED BY ARTIFICIAL SEA WATER FLOODS TO LOBLOLLY AND SLASH PINE SEEDLINGS,
Mississippi State Univ., State College. Dept. of Forestry.
S. B. Land, Jr.
Can J For Res, Vol 4, No 2, p 179-185, 1974, Illus.
Identifiers: Floods, Genetic effects, Ions, *Loblolly pine seedlings, Needles, *Pine, Pinus-elliottii, Pinus-taeda, Sea water, Seedlings, *Slash pine seedlings, Absorption.

Loblolly pine (Pinus taeda L.) and slash pine (P. eliottii Engelm.) seedlings from families of fullsib progenies were flooded with a 75% concentration of artificial sea water or with tap water for 2-4 days. The water potential and osmotic potential of the seedlings' needles decreased through 5 days of observations following the sea water flooding, and the contents of Cl- and Na+ ions increased. Injury and chloride content increased as depth of sea water above the surface of the soil increased. No injury occurred when seedlings were flooded with tap water to similar depths for the same period of time. For the particular families used, slash pine seedlings were more tolerant of sea water flooding than loblolly seedlings, and significant differences in tolerance among families within each species were obtained. Differences in rate of ion uptake and in needle water content were probably responsible for the effects of depth and genotype on injury.--Copyright 1974, Biological Abstracts, Inc.
W75-03261

EFFECT OF WATER STRESS ON ACID PHOSPHATASE ACTIVITY IN COTTON PLANTS, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Abidjan (Ivory Coast). Centre d'Adiopodoume.
P. Hanower, and J. Brzozowska.
Physiol Veg, Vol 11, No 2, p 385-394, 1973, English summary.
Identifiers: *Acid phosphatase, Chlorogenic acid, Chloroplasts, *Cotton, Cytoplasm, Leaves, Membranes, Phenols, *Water stress.

Acid phosphatase of cotton leaves is localized in the chloroplasts. After the chloroplasts are exposed to hypotonic media some activity remains associated with the membrane. The enzyme seems to be strongly attached to the chloroplast membranes. Water stress induces an increase in total activity of acid phosphatase and the appearance of high activity in the cytoplasmi whereas chloroplastic activity decreases. The inhibition of the enzyme activity by either exogenous chlorogenic acid or the cytoplasmic fraction rich in phenolic compounds is demonstrated.--Copyright 1974, Biological Abstracts, Inc.
W75-03262

EFFECT OF WATER STRESS ON ETHYLENE PRODUCTION BY DETACHED LEAVES OF VALENCIA ORANGE (CITRUS SINENSIS OSBECK),
Volcani Inst. of Agricultural Research, Bet-Dagan (Israel). Div. of Citriculture.
S. Ben-Yehoshua, and B. Aloni.
Plant Physiol, Vol 53, No 6, p 863-865, 1974, Illus.
Identifiers: Citrus-sinensis, Defoliation, *Ethylene production(Leaves), Humidity, *Oranges(Valencia), Turgidity, *Water stress, Relative humidity.

Detached leaves of Valencia oranges, C. sinensis Osbeck, emanated ethylene at markedly higher rates and contained more endogenous ethylene when placed under water stress at 55% relative humidity than when placed in water-saturated air. Water stress induced defoliation from detached branches. Relieving the water stress of such leaves by transfer to a mist chamber resulted in lowering of the rates of ethylene emanation to the level occurring in leaves maintained continuously in a mist chamber. This ability to recover from the water stress was evident for only up to 10-20 h of stress, when the relative turgidity of the leaves was 50-60%. Beyond that time the level of ethylene emanation of stressed leaves was not lowered by rehydration in a mist chamber; these overstressed leaves could not reabsorb their original water content. Ethylene emanation was in high correlation with the relative turgidity of detached leaves of oranges.--Copyright 1974, Biological Abstracts, Inc.
W75-03263

CARBOHYDRATE-PHOSPHORIC METABOLISM OF BARLEY PLANTS UNDER FLOOD CONDITIONS, (IN RUSSIAN),
Leningrad State Pedagogical Inst. (USSR).
V. V. Anikieu, L. I. Musorina, and A. V. Mikhailoua.
Fiziol Biokhim Kul't Rast, Vol 5, No 6, p 577-581, 1973. English summary.
Identifiers: *Barley, *Carbohydrates, Floods, *Metabolism, *Phosphorus.

Dynamics of soluble sugars and P of the acid-soluble fraction was studied in barley leaves and roots flooded at the 4th and 6th stages of organogenesis. Under the effect of excess moisture the content of soluble sugars increases and the amount of the P fractions drops. The changes in the content of soluble sugars is considered to be a result of disturbances in the phosphate energetic metabolism of a cell.--Copyright 1974, Biological Abstracts, Inc.
W75-03264

EFFECTS OF IRRIGATION ON MOSQUITO POPULATIONS AND MOSQUITE-BORNE DISEASES IN MAN, WITH PARTICULAR REFERENCE TO RICEFIELD EXTENSION,
Microbiology Research Establishment, Salisbury (England). Arbovirus Epidemiology Unit.
For primary bibliographic entry see Field 5C.
W75-03288

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

WATER FOR THE HUMAN ENVIRONMENT, VOLUME III, TECHNICAL SESSIONS.
For primary bibliographic entry see Field 2A.
W75-02751

THE ENVIRONMENTAL PROBLEMS IN AN URBAN FLOOD CONTROL PLANNING,
Taiwan Water Resources Planning Commission, Taipei.
For primary bibliographic entry see Field 6F.
W75-02760

ENVIRONMENTAL CONSIDERATIONS IN WATER RESOURCES DEVELOPMENT,
Bureau of Reclamation, Denver, Colo.
For primary bibliographic entry see Field 6G.
W75-02763

PLANNING, MANAGEMENT AND FINANCING OF INTERSTATE RIVER VALLEY PROJECTS IN INDIA,
Madhya Pradesh (India). Irrigation Dept., Bhopal.
For primary bibliographic entry see Field 6B.
W75-02765

SOCIOECONOMIC IMPACTS OF THE FEDERAL RECLAMATION PROGRAM IN THE UNITED STATES,
Bureau of Reclamation, Washington, D.C. Div. of Water and Land.
For primary bibliographic entry see Field 6B.
W75-02766

ENVIRONMENTAL PLANS AND IMPACTS FROM MAN MADE LAKES,
Madhya Pradesh Irrigation Dept., Raipur (India). Irrigation Mahanadi Bodhghat Hasdeo Project.
For primary bibliographic entry see Field 6G.
W75-02772

IMPACT OF TRADITIONAL WATER RESOURCES TECHNOLOGY ON THE HUMAN ENVIRONMENT,
State Univ. of New York, Syracuse. Coll. of Environmental Science and Forestry.
For primary bibliographic entry see Field 6G.
W75-02773

WATER RESOURCES DEVELOPMENT AND FLOOD CONTROL ALONG THE DANUBE RIVER,
Technical Univ. of Budapest (Hungary). Inst. of Water Management and Hydraulic Construction.
I. V. Nagy, and K. Cahun.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 295-306. 1 fig, 4 ref.

Descriptors: *Water resources development, Water resources, *Multiple-purpose projects, *Flood control, Watershed management, Water demand, Water quality, Navigation, Navigable rivers, Hydroelectric plants, Riparian rights, *Europe, International waters.
Identifiers: *Danube River Basin, Waterway network.

A survey was given on the major hydrological characteristics of the Danube River as an international waterway of all-European concern. The present state and the major tasks to be solved by the year 2000 of water resources utilization, the role of the river in the international waterway network, and the problems of flood control were discussed in detail. The fundamental problems of development as well as the basic principles of further national and international activities and cooperation were also discussed. (See also W75-02751) (Terstriep-ISWS)
W75-02777

THE RHINE-MAIN-DANUBE CONNECTION--A WATERWAY FOR EUROPE,
Rhein-Main-Donau A.G., Munich (West Germany). Managing Board.
H. Fuchs.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 307-314.

Descriptors: *Management, *Canals, *Europe, *Low-flow augumentation, *Cost-benefit analysis, Inland waterways, Locks, Hydraulic structures, Channels, Planning, Economics.
Identifiers: *Rhine-Main-Danube Connection, *Barrages, Bavaria, Federal Republic of Germany.

The entire spectrum of the Rhine-Main-Danube connection by German Federal Republic and the State of Bavaria, related to engineering, political, and economical aspects, was described and reviewed. The Rhein-Main-Donau AG has canalized the 292-kilometer stretch of the Main River between Aschaffenburg and Bamberg, improved the navigable channel conditions of the Danube from Regensburg to the German-Austrian frontier by low-water regulation works and construction of the Main-Danube Canal over a length of 70 km down to the new State Port at Nuremberg. Plans called for the completion of the project by 1980. The dimensions of the waterway permit traffic of vessels with a cargo capacity of 1350 tons, and push-type trains with up to 4000 tons cargo capacity. The conception of combining waterway and power station construction has so far enabled the company to finance roughly 68% of the incurred building costs from power station earnings. (See also W75-02751) (Bhowmik-ISWS)
W75-02778

WATER CONSERVATION AND POLLUTION CONTROL IN INDIA--AN ENVIRONMENTAL APPROACH,
A. B. Jacobs.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 442-448. 1 fig, 15 ref.

Descriptors: *Water conservation, *Water pollution control, *Water resources development, *Inter-basin transfers, *Drainage systems, Environment, Planning, Flood control, Hydrologic cycle, Water quality, Water control, Water chemistry, Precipitation(Atmospheric), Water purification, Hydrology, Domestic water, Water pollution sources, Environmental control, Agriculture.
Identifiers: *India, National Water Grid, *Ganga-Cauveri Link(India), Developing countries.

Water conservation and pollution control are matters of survival for many developing countries like India with predominantly agrarian economies. The proposed Ganga-Cauveri Link and the National Water Grid Will contribute greatly toward water conservation and pollution control. The Ganga-Cauveri Link envisions the linking of the Ganga River in the north of India and the Cauveri River in the south with other rivers and streams enroute. The National Water Grid envisions the optimum interlinking of water courses in India for the benefit of the nation. Environmental planning is essential. (See also W75-02751) (Henley-ISWS)
W75-02789

COLLECTION AND ANALYSIS OF REMOTELY SENSED DATA FROM THE RHODE RIVER ESTUARY WATERSHED,
Smithsonian Institution, Edgewater, Md. Chesapeake Bay Center for Environmental Studies.
For primary bibliographic entry see Field 2L.
W75-02806

FLOOD OF OCTOBER 1973 IN ENID AND VICINITY, NORTH-CENTRAL OKLAHOMA,
Geological Survey, Oklahoma City, Okla.
For primary bibliographic entry see Field 7C.
W75-02810

FRESH WATER SEAL IN RIVER SLUICE.
For primary bibliographic entry see Field 8A.
W75-02861

FLASH-FLOOD WARNING SYSTEMS.
California Geology, Vol 27, No 1, p 7, January, 1974.

Descriptors: *Flash floods, *Warning systems, Flood control, Rivers, Water level recorders, Flood forecasting, Automation, Control systems.
Identifiers: National Weather Service, Alarm systems.

The new flash flood warning system of the National Weather Service is described. The system has three main elements, linked together by electrical circuitry: an automatic water level sensor at an upstream point on the river; an intermediate station several miles or more downstream to provide power to the sensor; and a community alarm station from which warnings can be spread quickly to the public. The Weather Bureau is planning a major campaign to encourage greater use of these life and property saving devices. (Merritt-FIRL)
W75-02863

DEVELOPMENT OF A REFERENCE RAIN SYSTEM FOR THE DIMENSIONS OF SEWER NETWORKS (ENTWICKLUNG EINES BERECHNUNGSREGENS FUER DIE BEMESSUNG VON KANALNETZEN),
For primary bibliographic entry see Field 5D.
W75-02866

FORECASTING RAINFALL AND SNOWMELT FLOODS ON UPPER MIDWEST WATERSHEDS,
Minnesota Univ., Minneapolis. St. Anthony Falls Hydraulic Lab.
For primary bibliographic entry see Field 2E.
W75-02887

COSTS AND RETURNS FROM CROPS AND LIVESTOCK IN THE UPLAND DESERT VALLEYS OF NEVADA,
Nevada Univ., Reno. Desert Research Inst.
F. Rogers, and W. V. Neely.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-238 302, $4.25 in paper copy, $2.25 in microfiche. Desert Research Institute, No 2, Progress Report Series Center for Water Resources Research (Max C. Fleischmann College of Agriculture, Report Series R 26), August 1966. 58 p, 1 fig, 30 tab, 1 append. OWRT B-011-NEV(1). 14-01-0001-568.

Descriptors: *Costs, *Return(Monetary), *Deserts, Valleys, Desert Land Act, Crops, Irrigation, Budgeting, Economics, Livestock, Agriculture, Farms, Till, *Groundwater, *Irrigation wells, *Nevada, Water costs, Water resources development, Land use.
Identifiers: *Desert land development, Development costs, Clearing and tillage costs, Social costs.

Nevada's desert valleys are currently the scene of many attempts by individuals to develop profitable irrigated farms. Desert land development in Nevada so far has met with a relatively low degree of success. Bureau of Land Management records indicate that only a small percentage of applicants under the Desert Land Act have received patents for any portion of the land they entered. Despite the seemingly apparent difficulties associated with developing desert land in Nevada, interest in filing for new lands and attempts to profitably farm existing entries continues to run high. The information presented herein is applicable to desert land development regardless of entry procedure. Lack of input-output information for enterprises that might be produced in these desert valleys is one of the serious planning handicaps facing current and prospective operators. The budget data presented here on selected crop and livestock enterprises are designed to fill this gap. These data are a summary of that collected at meetings and interviews with producers and Extension personnel in Diamond, Quinn River, Kings River, Middle Reese River, and Antelope Valleys during 1964 and 1965. (Campell-NWWA)
W75-02898

PROCEDURES FOR DETERMINING THE ORDER OF DEPENDENCE IN STREAMFLOW RECORDS,
Arizona Univ., Tucson. Dept. of Mathematics.
J. L. Denny, C. C. Kisiel, and S. J. Yakowitz.
Water Resources Research, Vol 10, No 5, p 947-954, October 1974. 2 tab, 17 ref. OWRT A-023-ARIZ(4).

Descriptors: *Streamflow forecasting, *Stochastic processes, *Markov processes, Mathematical models, Probability, Hydrologic properties, *Arizona, Streamflow, Hydrology, Intermittent streams, Ephemeral streams, Hydrographs.
Identifiers: *Order of dependence, Rillito Basin(Ariz), Sabino Creek(Ariz), Kolmogorov-Smirnov test.

Statistical techniques were outlined for determining the Markov order within historic streamflow data. The methodology was discussed and illustrated by using the records of gaging stations in the Tucson Basin. Care was taken to describe the hydrologic properties of Rillito Creek and its tributaries (particularly the Subino Creek), because these properties may ultimately be crucial in establishing some a priori feelings for the range of likely orders. (Jess-ISWS)
W75-02903

A STOCHASTIC MODEL FOR DAILY RIVER FLOWS IN AN ARID REGION,
Arizona Univ., Tucson. Dept. of Systems and Industrial Engineering.
For primary bibliographic entry see Field 2E.
W75-02907

GREAT LAKES CONNECTING CHANNELS WIDENING AND DEEPENING BENDS IN ST. MARY'S RIVER MICHIGAN, PHASE III, (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Detroit, Mich.
Available from National Technical Information Service, Springfield, Va. 22161, U.S. Dept. of Commerce, as EIS-MI-73-2024-F, $4.75 in paper copy, $2.25 in microfiche. December 1973. 95 p, 11 fig, 28 tab.

Descriptors: *Environmental effects, *Dredging, *Great Lakes, *Inland waterways, *Navigable Rivers, Michigan, Federal government, Administrative agencies, Water resources development, Rivers, Channel improvement, Excavation, Spoil banks, Disposal, Governmental interrelations, Navigation, Navigable waters, Water policy, Channels, Aquatic habitats, Rivers and Harbors Act.
Identifiers: *Environmental Impact Statements, *Navigation obstructions, *National Environmental Policy Act.

Phase III of this project involves the dredging of Mission Point bend of the St. Mary's River. The waterway is a major navigation channel flowing from Lake Superior into Lake Huron. This is the final phase of a comprehensive project involving the widening and deepening of six bend areas of the river to accommodate the larger vessels scheduled to navigate the Great Lakes. Approximately 360,000 cubic yards of unpolluted spoil material will be deposited in a confined disposal site adjacent to a nearby shoreline park. Construction operations will temporarily increase turbidity, will release bottom nutrients, and will temporarily disrupt recreational use of the project area. Increased use of the channel will adversely affect benthic, aquatic, and alluvial life and will contribute to shore erosion. Dredging will remove approximately 12 acres of river bottom and the disposal site will cover 11 acres of river bottom and 19 acres of campground. The use of tugboats to assist the larger vessels, restrictions upon use of the channel, no action, and alternative disposal sites were considered to be unacceptable aternatives to the proposed action. There is some public

concern over the effects of the release of nutrients, such as phosphorus, resulting from dredging operations. (Deckert-Florida)
W75-02969

POCATALICO RIVER BASIN JOINT SURVEY, ROANE, JACKSON, PUTNAM, AND KANAWHA COUNTIES, WEST VIRGINIA. INTERIM REPORT (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Soil Conservation Service, Washington, D.C.
Available from National Technical Information Service, Springfield, Va. 22161, U.S. Dept. of Commerce as EIS-WV-73-1420-F, $4.25 in paper copy, $2.25 in microfiche. August 29, 1973. 67 p, 8 tab, 1 map.

Descriptors: *West Virginia, *Environmental effects, *Dam construction, *Water supply, *Water quality control, Federal government, Siltation, Turbidity, Water pollution effects, Economic impact, Mineral industry, Industrial wastes, Recreational facilities, Rivers, River basins, Dams, Flood protection, Erosion, Water pollution administrative agencies, Water quality, Environment, Oil fields, Industrial water, Coal mine wastes, Adoption of practices, Natural resources, Conservation, Wildlife, Cost-benefit analysis.
Identifiers: *Environmental Impact Statements, *Roan, Jackson, Putnam, and Kanawha Counties, W. Va., *National Environmental Policy Act.

The project, located in the Pocatalico River Basin, West Virginia, involves treatment on about 2400 acres of basin lands and two multiple purpose dams serving many vital purposes of the region. Primarily rural in a mountainous area, the basin includes coal, oil and gas resource development. Industrial waste has polluted the water supply so that there is a critical shortage in the area. Flooding, sedimentation and erosion are frequent problems. The measures proposed will provide feasible and long-term solutions to water supply problems, to flood and sedimentation problems, to stream pollution, regulation of streamflow, stabilization of erosion, preservation of ecologically important resources and enhancement of overall environmental quality. Adverse effects include relocation of forty residences, influx of traffic and people to recreational facilities, temporary turbidity of streams during construction, and permanent removal of 440 acres of farm and forestland. Use of ground water was considered inadequate and construction of a line pumping facility was considered too expensive. The project's projected life is 100 years. Irretrievable commitments include land, materials, and labor purchased for project installation and maintenance. Comments were received from 12 government agencies. (Dillingham-Florida)
W75-02970

INCREASING HEIGHT OF LEVEES ALONG RIO GRANDE UPSTREAM FROM RETAMAL DAM AND ALONG MAIN AND NORTH FLOODWAYS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
International Boundary and Water Commission, El Paso, Tex.
Available from National Technical Information Service, Springfield, Va 22161, U.S. Dept. of Commerce, as EIS-TX-73-1730-F, $4.25 in paper copy, $2.25 in microfiche. 1973. 74 p, 4 tab, 4 map.

Descriptors: *Environmental effects, *Levees, *Rio Grande River, *Federal government, *International Boundary and Water Commission, Flood control, Floodways, Flood protection, Floods, Flood damage, Water management(Applied), Watersheds(Divides), *Texas, Southwest US, Mexico, Governmental interrelations, International waters, Civil engineering, Adoption of practices, Land management, Conservation.
Identifiers: *Environmental Impact Statements, *International agreements.

Levee improvement measures are part of more extensive modifications to the existing United States portion of the international flood control system along the Rio Grande River. This phase of the project involves raising levees along the river at locations upstream from Retamal Dam, and along Main and North Floodways, in Hidalgo, Cameron, and Willacy Counties, Texas. These measures will provide greater flood control needed to protect United States lands. 452 acres of land will be committed for borrow sources, 111 acres will be removed from cultivation, and 42 acres will be changed from brushland to grassland. Minor temporary interference with transportation and the fishery will occur during construction. The plan selected has the least environmental impact and is the most economical of the combinations of new and existing floodways considered. The extensive flood damage to urban and rural areas in the Rio Grande Valley, due to inadequate floodway capacities, will be substantially reduced. There is no significant opposition to this project. (Deckert-Florida)
W75-02971

GILA RIVER CHANNEL IMPROVEMENTS BETWEEN CAMELSBACK RESERVOIR SITE AND SALT RIVER ARIZONA (UPPER END OF SAFFORD VALLEY BETWEEN THE BROWN CANAL, ETC....) (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Los Angeles, Calif.
For primary bibliographic entry see Field 3B.
W75-02972

REPORT OF PROCEEDINGS AT PUBLIC HEARING CONCERNING RECLASSIFICATION OF CERTAIN WATERS--THE UPPER CAPE FEAR RIVER BASIN (FROM SOURCE TO THE HARNETT-LEE COUNTY LINE), UPPER ROANOKE RIVER BASIN (FROM SOURCE TO CASWELL-PERSON COUNTY LINE), AND YADKIN-PEE DEE RIVER BASIN.
North Carolina Dept. of Natural and Economic Resources, Raleigh. Office of Air and Water Resources.
For primary bibliographic entry see Field 5G.
W75-02976

REPORT OF PROCEEDINGS AT PUBLIC HEARING CONCERNING THE RECLASSIFICATION OF VARIOUS STREAMS IN THE BROAD, CATAWBA, FRENCH BROAD, HIWASSEE, LITTLE TENNESSEE, NEW AND WATAUGA RIVER BASINS.
North Carolina Dept. of Natural and Economic Resources, Raleigh. Office of Water and Air Resources.
For primary bibliographic entry see Field 5G.
W75-02977

A SUMMARY OF RAINFALL INTERCEPTION BY CERTAIN CONIFERS OF NORTH AMERICA,
Forest Service (USDA), Wenatchee, Wash. Forest Hydrology Lab.
For primary bibliographic entry see Field 2A.
W75-03030

THE NEED FOR NATURE PRESERVES,
Purdue Univ., Lafayette, Ind. Dept. of Biological Sciences.
For primary bibliographic entry see Field 2A.
W75-03033

EVALUATING THE EFFECTS OF WATER YIELD MANAGEMENT,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 3B.
W75-03037

RESEARCH AND DEVELOPMENT OF A SELECTIVE ALGAECIDE TO CONTROL NUISANCE ALGAL GROWTH,
Dow Chemical Co., Freeport, Tex.
For primary bibliographic entry see Field 5C.
W75-03046

EXPERIMENTAL APPLICATION OF ALIQUAT-4 AND COPPER FOR CONTROL OF PONDWEEDS,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 5G.
W75-03056

A STUDY OF NATURALLY OCCURRING ALGICIDES PRODUCED BY FRESHWATER ALGAE,
Kentucky Water Resources Inst., Lexington.
For primary bibliographic entry see Field 5G.
W75-03084

HYDROLOGY OF POROUS PAVEMENT PARKING LOTS,
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W75-03098

IMPACTS OF COLORADO RIVER SALINITY,
Colorado River Board of California, Los Angeles.
For primary bibliographic entry see Field 5C.
W75-03102

DETERMINE STREAMFLOWS FROM GEOMORPHIC PARAMETERS,
Washington State Univ., Pullman. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 2E.
W75-03103

EFFECT OF SNOW COVER ON UPWARD MOVEMENT OF SOIL MOISTURE,
National Weather Service, Silver Spring, Md. Hydrologic Research and Development Lab.
For primary bibliographic entry see Field 2G.
W75-03106

REMOTE SENSING IN MICHIGAN FOR LAND RESOURCE MANAGEMENT: WATERFOWL HABITAT MANAGEMENT AT POINTE MOUILLEE,
Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
A. N. Sellman, I. J. Sattinger, L. B. Istvan, W. R. Enslin, and W. L. Myers.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-20976, $3.75 in paper copy, $2.25 in microfiche. National Aeronautics and Space Administration CR-ERIM 193400-1-T, April 1974. 42 p, 9 fig, 6 tab, 13 ref, 1 append. NGR 23-005-552, NGL 23-004-083.

Descriptors: *Marsh management, Basic data collections, *Remote sensing, *Michigan, *Habitat improvement, Food and cover crops, Vegetation, *Land management, Marshes, *Lake Erie, *On-site data collections, Wildlife management, Aerial photography, Documentation, *Waterfowl.
Identifiers: Pointe Mouillee(Mich).

For many years the Pointe Mouillee State Game Area, located on the Lake Erie shoreline just south of Detroit, has been a prime waterfowl habitat. The usefulness of the site for this purpose has been impaired because of the gradual deterioration of the marshland and severe flooding and storms during the spring of 1973. Also, it has been proposed that a dredge spoils area be located in or near the marsh. To help solve the problems affecting Pointe Mouillee, an investigation was un-

dertaken which used remote sensing methods for data acquisition. To aid the future management of a diked refuge area of 148 hectares within the State Game Area, a detailed vegetation inventory was prepared by photointerpretation and a generalized vegetation inventory was obtained by processing multispectral scanner imagery. An analysis was conducted to determine the magnitude of past losses of marshland and the possibilities of replacing this lost habitat. The analysis indicated that large additions to waterfowl habitat could be provided by changes in management of vegetation in existing sections of the State Game Area, through acquisition and conversion of adjacent land by the Michigan Department of Natural Resources, and by the proposed construction of a barrier dike offshore of Pointe Mouillee. Altogether, the various measures considered could affect a total area of nearly 13 sq km. (Humphreys-ISWS)
W75-03120

A SURVEY OF LANDOWNERS' ATTITUDES AND OPINIONS IN THE SAWTOOTH VALLEY,
Idaho Univ., Moscow. Water Resources Research Inst.
For primary bibliographic entry see Field 6B.
W75-03132

THE ROLE OF LAKE PROPERTY OWNERS AND THEIR ORGANIZATIONS IN LAKE MANAGEMENT,
Wisconsin Univ., Madison. Inland Lake Demonstration Project.
For primary bibliographic entry see Field 6E.
W75-03138

SCENIC RIVER STUDY OF THE LOWER ST. CROIX RIVERS.
Bureau of Outdoor Recreation, Washington, D.C.
For primary bibliographic entry see Field 6B.
W75-03141

PROPOSED NATURAL AREAS: PIVOT ROCK SPRING REPORT NO. 34,
Arizona Academy of Science, Tempe.
For primary bibliographic entry see Field 6B.
W75-03142

THE POLITICAL ECONOMY OF REGIONAL WATER INSTITUTIONS,
Arizona Univ., Tucson.
For primary bibliographic entry see Field 6E.
W75-03147

RAILROADS, IRRIGATION, AND ECONOMIC GROWTH: THE SAN JOAQUIN VALLEY OF CALIFORNIA,
California State Univ., Fresno.
For primary bibliographic entry see Field 6B.
W75-03150

MATHEMATICAL GENERALIZATION OF STREAM TEMPERATURE IN CENTRAL NEW ENGLAND,
Geological Survey, Boston, Mass.
For primary bibliographic entry see Field 2K.
W75-03157

FLOODS IN IOWA: A COMPARATIVE STUDY OF REGIONAL FLOOD FREQUENCY METHODS,
Geological Survey, Iowa City, Iowa.
For primary bibliographic entry see Field 2E.
W75-03161

FLOOD-VOLUME DATA FOR IOWA STREAMS,
Geological Survey, Iowa City, Iowa.
For primary bibliographic entry see Field 7C.
W75-03162

THE WATER SUPPLY INDUSTRY.
For primary bibliographic entry see Field 5F.
W75-03189

SHORELINE FORESTS OF LAKE TE ANAU, FIORDLAND,
Otago Univ., Dunedin (New Zealand). Dept. of Botany.
For primary bibliographic entry see Field 5C.
W75-03191

HYDROGEOLOGIC CHARACTERIZATION OF CALMATUI-GROPENI DAM ENCLOSURE, (IN RUMANIAN),
Institutul de Studii si Cercetari Pedologie, Bucharest (Rumania).
C. Ivan.
An Inst Stud Cercet Pedol, 39, p 435-443, 1971, Illus, English summary.
Identifiers: Agriculture, Dams, Drainage, *Hydrogeology, Irrigation, *Romania(Calmatui-Gropeni Dam).

Natural drainage favorable to agriculture was evidenced both by the direction of subterranean flow and by zone sequence as a function of hydrostatic level. Evaluation of hydrostatic level variation ranges, indicated the development of a hydrogeologic regime which is influenced by reclamation layouts (irrigation). Qualitative analysis of ground water showed values exceeding the permissible limits in all the indexes on large areas (especially in the southern parts) of this area in Romania.--Copyright 1974, Biological Abstracts, Inc.
W75-03192

MEKY RIVER DIVERSION SCHEME,
Awash Valley Authority, Addis Ababa (Ethiopia).
For primary bibliographic entry see Field 3B.
W75-03195

A STUDY OF THE UNIQUENESS OF THE SOIL MOISTURE CHARACTERISTIC DURING DESORPTION BY VERTICAL DRAINAGE,
Grenoble Univ. (France). Laboratories de Mecanique des
For primary bibliographic entry see Field 2G.
W75-03231

DETERMINATION OF EQUIVALENT RADII FOR RECTANGULAR DRAINS,
Arizona Univ., Tucson. Dept. of Soils, Water and Engineering.
For primary bibliographic entry see Field 8B.
W75-03232

REGULATION OF GREAT LAKES WATER LEVELS--APPENDIX B--LAKE REGULATION, VOL 1,
International Joint Commission-United States and Canada. Great Lakes Levels Board.
For primary bibliographic entry see Field 2H.
W75-03277

4B. Groundwater Management

GROUND-WATER-QUALITY MONITORING SYSTEMS,
ENWATS, Cambridge, Mass.
For primary bibliographic entry see Field 5A.
W75-02787

HYDROLOGIC DATA BANK USERS GUIDE,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 7C.
W75-02796

WATER-RESOURCES DATA COLLECTED IN THE DEVILS HOLE AREA, NEVADA, 1972-1973,
Geological Survey, Las Vegas, Nev.
For primary bibliographic entry see Field 7C.
W75-02797

WATER FACTORY 21,
Orange County Water District, Fountain Valley, Calif. Board of Directors.
For primary bibliographic entry see Field 5D.
W75-02874

STRATIGRAPHIC IDENTIFICATION AND CORRELATION OF BASALT AQUIFERS USING GEOPHYSICAL AND CHEMICAL TECHNIQUES,
Washington State Univ., Pullman. Coll. of Engineering Research Div.
For primary bibliographic entry see Field 2F.
W75-02896

COSTS AND RETURNS FROM CROPS AND LIVESTOCK IN THE UPLAND DESERT VALLEYS OF NEVADA,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 4A.
W75-02898

PHYSICAL AND ECONOMICAL ASPECTS OF CONJUNCTIVE USE OF IRRIGATION WATER IN SMITH VALLEY, LYON COUNTY, NEVADA,
Nevada Univ., Reno. Desert Research Inst.
P. A. Domenico, D. F. Schulke, and G. B. Maxey.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-238 301, $4.25 in paper copy, $2.25 in microfiche. Technical Report Series H-W, Hydrology and Water Resources, Publication No 1, July 1966. 47 p, 19 fig, 4 tab, 13 ref. OWRT B-007-NEV(1). 14-01-0001-564.

Descriptors: *Irrigation wells, Water sources, *Groundwater, Irrigation systems, Droughts, *Economics, Irrigation water, Well yield, Hydrology, Administration, Aquifers, Surface waters, Water resources development, *Nevada.
Identifiers: Smith Valley(Nev), Lyon County(Nev), West Walker River(Nev).

Supplemental irrigation wells in Smith Valley are individually owned and operated and can be used in conjunction with surface water to irrigate about 6300 acres of land whereas an additional 8700 acres have surface-water rights only. Most of the wells were drilled in 1960 and 1961 to offset severe drought that posed a serious threat to the agricultural industry. Having served this energency purpose, ground water is now used only to a limited extent. Predicted on the basis of deficiencies of historic surface flow, supplemental pumping will be required on the average about two out of every five years. Owing to developed capacity of the ground water supply, most conjunctive appropriators are virtually assured of a full supply of irrigation water every season regardless of the flow of the West Walker River. Predicted on the basis of historic flow and well yield and assuming centralized or district operation of the well fields for the benefit of the entire valley, existing pumping facilities could provide about 93% assurance of a full supply of irrigation water for all appropriators in Smith Valley. Further, analysis based on returns from ranching and cost of supplemental pumping for various levels of demand, efficiency, and lift, indicates that more water could be pumped cheaper with the existing wells if the operation were centralized instead of under individual control. An administrative mechanism by which the hydrologic system could be effectively managed is discussed. (Campbell-NWWA)
W75-02899

WATER RIGHTS LAW AND PUBLIC POLICIES RELATING TO GROUND WATER 'MINING' IN THE SOUTHWESTERN STATES,
Kansas State Univ., Manhattan.
E. S. Bagley.
Journal of Law and Economics, Vol 4, p 144-174, 1961. 108 ref.

Descriptors: *Groundwater mining, *Water law, *Southwest U.S., *Regulation, *Water supply, Water utilization, Water resources, Groundwater, Withdrawal, Subsurface waters, Water sources, Water demand, Groundwater resources, Water resources development, Water conservation, Water management(Applied), Water rights, Appropriation, Relative rights, Water policy, Overlying proprietor, Legislation, Economics, Legal aspects, Water allocation(Policy).
Identifiers: Water rights(Non-riparians), Comparative law.

Despite efforts in many of the states to curtail the rate of groundwater withdrawal, overdrafts are believed to be occurring in many communities in the southwestern United States. Based on a 1958-59 study conducted by the author, some of the legal, economic, and policy considerations involved in the utilization of stored water supplies are discussed. An analysis is made of the relationship between groundwater hydrology and groundwater laws. The effects of the traditional water law doctrines of appropriation, absolute ownership, reasonable use, and correlative rights upon the allocation of groundwater supplies are also examined. Comparison is made among the southwestern states between the legal status of groundwater mining in the appropriation states and its status in the landownership states. Economic feasibility is the primary factor regulating the rate of groundwater withdrawal. Several reasons are presented to explain why current efforts to curtail overdrafts are ineffective. (Sperling-Florida)
W75-02946

DETERMINING POROSITY WITH NEUTRON LOGS FROM HAWAIIAN BASALTIC AQUIFERS,
Hawaii Univ., Honolulu. Water Resources Research Center.
F. L. Peterson, and M. M. Sehgal.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 344, $3.75 in paper copy, $2.25 in microfiche. Technical Report No 8, August 1974. 37 p, 10 fig, 1 tab, 10 ref, append. OWRT A-034-HI(1). 14-31-0001-3811.

Descriptors: *Logging(Recording), *Radioactive well logging, Well data, Calibrations, *Porosity, Input-output analysis, *Hawaii, *Aquifers, *Boreholes, Basalts.

Neutron count data for calibration purposes were collected by neutron logging in 4 boreholes, and porosity data were determined from photologs run on the same 4 borehole. A neutron count-porosity calibration curve was constructed and was found to take the form of the logarithm of neutron count versus porosity. The calibration urve was calculated by linear regression analysis, utilizing empirical field data. The calibration curve is valid within the expressed 95 percent confidence intervals only for neutron logs from (1) basaltic formations, (2) uncased holes, and (3) borehole diameters from 20.32 to 30.48 cm (8 to 12 in.).
W75-02978

ANALYSIS OF THE IMPACT OF LEGAL CONSTRAINTS ON GROUNDWATER RESOURCE DEVELOPMENT IN IDAHO,
Idaho Bureau of Mines and Geology, Moscow.
D. R. Ralston, D. L. Grant, H. L. Schatz, and D. Goldman.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 347, $5.25 in paper copy, $2.25 in microfiche. Pamphlet No 158, September 1974. 111 p, 18 fig, 1 tab, 12 ref. OWRT B-019-Ida(2), B-031-Ida(1). 14-31-001-3578 and 4076.

Descriptors: Groundwater, Planning, Economics, Pumping, Natural recharge, Management, *Idaho, *Water management(Applied), *Institutional constraints, Legal aspects, *Groundwater resources, *Administrative decisions.
Identifiers: Raft River Valley(Idaho), Pumping lift, *Legal constraints.

The problem of groundwater management under the legal code of Idaho has been investigated from the viewpoints of hydrology, engineering, economics, and law. Legal guidelines for groundwater management are subject to a wide range of interpretation; the concept of 'reasonable pumping lift' is valid only if adequate definitions and techniques are used by resource administrators. The concept of 'reasonably anticipated average rate of future natural recharge' is the greatest problem for resource administrators. (Trihey-Idaho)
W75-02981

THE HYDRO-MECHANICS OF THE GROUND WATER SYSTEM IN THE SOUTHERN PORTION OF THE KAIBAB PLATEAU, ARIZONA,
Arizona Univ., Tucson.
For primary bibliographic entry see Field 2F.
W75-02993

RENOVATING SEWAGE EFFLUENT BY GROUND WATER RECHARGE,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 5D.
W75-03036

SHORELINE EROSION IN UPPER CHESAPEAKE BAY: THE ROLE OF GROUNDWATER,
Westinghouse Ocean Research Lab., Annapolis, Md.
For primary bibliographic entry see Field 2L.
W75-03089

INTERBASIN GROUND-WATER FLOW IN SOUTHERN NEVADA,
Mackay School of Mines, Reno, Nev.
For primary bibliographic entry see Field 2F.
W75-03096

RADIAL DISPERSION IN GROUND-WATER FLOW,
Canterbury Univ., Christchurch (New Zealand). Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-03100

EXPLORATORY FIELD STUDY OF A GROUND WASTE DISPOSAL FACILITY,
Hanford Atomic Products Operation, Richland, Wash.
For primary bibliographic entry see Field 5B.
W75-03117

HYDROLOGIC RELATIONSHIP OF JEFFERSON COUNTY LANDFILL LEACHATE AND MERAMEC HEIGHTS AREA SPRINGS,
National Field Investigations Center, Denver, Colo.
For primary bibliographic entry see Field 5B.
W75-03128

MATHEMATICAL MODEL OF THE SAN JUAN VALLEY GROUND-WATER BASIN, SAN BENITO COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
R. E. Faye.
Water-Resources Investigations 58-73, August 1974. 39 p, 19 fig, 1 tab, 6 ref.

Descriptors: *Mathematical models, *Groundwater basins, *California, *Artifical recharge, Water management(Applied), Water balance, Withdrawal, Water levels, Surface-groundwater relationships.
Identifiers: *San Juan Valley(Calif).

A mathematical model of the San Juan Valley groundwater basin in San Benito County, Calif., quantitatively describes the groundwater hydrology of the basin under past, present, and future conditions of development. Prior to large-scale groundwater development, net recharge equaled 9.23 cfs and occurred as subsurface flow to the eastern part of the basin and infiltration of rain, direct runoff, and minor streamflows. Net predevelopment discharge equaled 9.23 cfs and occurred as aquifer discharge to the San Benito River. The 9.23 cfs of predevelopment recharge is considered to be perennial recharge to the basin. Large-scale groundwater development occurred in the area during the period 1945-68 and caused water levels to decline throughout most of the basin. Progressive depletion of aquifer storage during this period changed the San Benito River from a gaining (perennial) stream to a losing stream along most of its reach in the basin area. Net discharge from the basin during the period 1945-68 averaged 18.10 cfs. Of this amount 17.82 cfs occurred as pumpage from wells, and 0.28 cfs occurred as basin discharge to the San Benito River. Net recharge to the basin during the same period averaged 13.57 cfs. Of this amount 4.34 cfs occurred as infiltration from the San Benito River and 9.23 cfs occurred as perennial recharge. Water levels in San Juan Valley will stabilize or recover when additional recharge equals or exceeds 3,000 acre-feet per year. (Knapp-USGS)
W75-03153

A PROGRESS REPORT ON RESULTS OF TEST-DRILLING AND GROUND-WATER INVESTIGATIONS OF THE SNAKE PLAIN AQUIFER, SOUTHEASTERN IDAHO: PART 3. LAKE WALCOTT-BONANZA LAKE AREA,
Geological Survey, Boise, Idaho.
E. G. Crosthwaite.
Available from Dept. of Water Resources, State Capitol Bldg., Boise, Idaho 83720. Price $0.50. Idaho Department of Water Resources, Boise, Information Bulletin No 38, August 1974. 25 p, 7 fig, 10 ref, append.

Descriptors: *Hydrogeology, *Aquifers, *Idaho, *Groundwater, Water wells, Basalts, Aquifer characteristics, Water yield, Irrigation water, Electrical studies, Geophysics.
Identifiers: *Snake Plain Aquifer(Idaho).

Direct-current resistivity soundings and exploratory drilling suggest that the basalt of the Snake River Group in southeastern Idaho is relatively thin in the area along the Snake River that is topographically suitable for pumping large quantities of groundwater in exchange for surface water. The formations underlying the Snake River Group appear to have low permeability and probably would not yield large amounts of water. The southern edge of the Snake Plain aquifer probably is several miles north of the river, and may be arbitrarily approximated by a straight line drawn from Minidoka Dam to American Falls. The formations older than the basalt of the Snake River Group do not have a significant groundwater potential. The exploratory wells and electrical resistivity data indicate that the area is not suitable for the withdrawal of large quantities of groundwater for irrigation. (Knapp-USGS)
W75-03155

DEPTH TO BEDROCK IN WISCONSIN,
Geological Survey, Madison, Wis.
For primary bibliographic entry see Field 7C.
W75-03156

EFFECT OF IRRIGATION PUMPING ON DESERT PUPFISH HABITATS IN ASH MEADOWS, NYE COUNTY, NEVADA,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 5C.
W75-03163

FLUCTUATIONS OF THE WATER TABLE IN LEE COUNTY, FLORIDA, 1969-1973,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 2F.
W75-03164

COMBINING GEOELECTRICAL AND DRILL HOLE INVESTIGATIONS FOR DETECTING FRESH WATER AQUIFERS IN NORTHWESTERN MISSOURI,
Missouri Univ., Rolla.
R. K. Frohlich.
Geophysics, Vol 39, No 3, p 340-352, June 1974.

Descriptors: *Resistivity, *Groundwater, *Aquifers, Glacial aquifers, Channels, *Missouri, Potable water, Salinity, *Drill holes, Gravels, *Conductivity, Saline water intrusion, Permeability, Porosity.

Potable groundwater in Northwestern Missouri is limited and is adjoint to water of high salinity. A geoelectric investigation was conducted in this area which was previously explored by drill holes. The resistivity depth soundings, using the Schlumberger arrangement could partially localize and determine the thickness and depth of both near-surface and basal fresh-water bearing gravel bodies in glacial deposits. The basal gravel is usually confined to preglacial stream channels and are important fresh water aquifers. In only a few cases did resistivity increase at the depth of the bedrock. High permeability and porosity at a lower water conductivity in the gravel is compensated by lower permeability and porosity at a higher water conductivity in the bedrock. An increase of resistivity in the deeper bedrock occurs due to a tightening of fissures containing salt water. In one instance it was shown that the salt content of the well water originated from salt water encroachment, probably from the bedrock.
W75-03234

4C. Effects On Water Of Man'S Non-Water Activities

THE ENVIRONMENTAL PROBLEMS IN AN URBAN FLOOD CONTROL PLANNING,
Taiwan Water Resources Planning Commission, Taipei.
For primary bibliographic entry see Field 6F.
W75-02760

NOTES ON A HISTORY OF WATERUSE,
Wisconsin Univ., Madison. Coll. of Agricultural and Life Sciences.
For primary bibliographic entry see Field 5D.
W75-02771

METHODS OF AVALANCHE CONTROL ON WASHINGTON MOUNTAIN HIGHWAYS--THIRD ANNUAL REPORT,
Washington Univ., Seattle. Geophysics Program; and Washington Univ., Seattle. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2C.
W75-02803

HYDROLOGIC DATA FOR URBAN STUDIES IN THE HOUSTON, TEXAS METROPOLITAN AREA, 1972,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 2E.
W75-02813

EFFECT OF AIRCRAFT DEICER ON AIRPORT STORM RUNOFF,
Department of Transport, Ottawa (Ontario).
For primary bibliographic entry see Field 5B.
W75-02872

VEGETATIVE MANAGEMENT AND WATER YIELD RELATIONSHIPS,
California Univ., Davis. Dept. of Water Science and Engineering.
For primary bibliographic entry see Field 3B.
W75-03038

HYDROLOGY OF POROUS PAVEMENT PARKING LOTS,
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W75-03098

HYDROLOGY OF 7-DAY 10-YR LOW FLOWS,
Illinois State Water Survey, Urbana. Hydrology Section.
For primary bibliographic entry see Field 5B.
W75-03104

THE DELINEATION OF AND FACTORS AFFECTING MISSISSIPPI COASTAL ESTUARIES AND TIDAL MARSHES,
Mississippi Univ., University. Dept. of Urban and Regional Planning.
For primary bibliographic entry see Field 5G.
W75-03124

REPORT OF VEGETATION STUDY,
Idaho Univ., Moscow. Water Resources Research Inst.
For primary bibliographic entry see Field 6B.
W75-03133

4D. Watershed Protection

PROBLEMS OF GREAT LAKES SHORE EROSION,
Wisconsin Univ., Milwaukee. Dept. of Mechanics.
W. T. Painter.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 40-60. 11 fig, 1 tab, 19 ref.

Descriptors: Management, *Erosion, *Great Lakes, *Erosion control, *Seepage control, *Lake shores, Waves(Water), *Slope stability, Geology, Soil mechanics, Landslides, Mudflows, Runoff, Lakes, Groundwater, Flow, Riprap, *Wisconsin.
Identifiers: *Milwaukee(Wisc), La Salette Landslide.

Guidelines for lakeshore stabilization were described; and pertinent aspects fundamental for planning remedial measures such as geology, soil mechanics, groundwater flow, and slope stability analysis were reviewed. During the past decade, above average precipitation has occurred in the Great Lakes basin causing larger quantities of water to flow to the lakes and higher lake levels. Because of increased runoff, groundwater flow, and wave action, shore erosion was widespread in the Great Lakes. Stabilization procedures such as pumping and draining of seepage flow, and placing suitably sized crushed rock and concrete rubble over the landslide areas were utilized in Milwaukee on the Lake Michigan shore. These techniques were reviewed and discussed for general application. (See also W75-02751) (Bhowmik-ISWS)
W75-02755

CONCEPTS OF WATERSHED MANAGEMENT: THE SODIUM BUDGETS OF LAKE CHAMPLAIN,
Vermont Univ., Burlington. Lake Champlain Studies Center.
For primary bibliographic entry see Field 5B.
W75-02788

BIOLOGICAL HYDROLOGIC SYSTEMS,
Office of Water Resources Research, Washington, D.C.
W. A. Hall.
In: Biological Effects in the Hydrological Cycle, Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana. p 1-7. 1 fig, 2 ref.

Descriptors: *Hydrologic systems, *Hydrology, *Watershed management, *Hydrobiology, Watersheds(Basins), Management, Planning, Model studies, Evaluation.
Identifiers: *Biological effects.

The importance of studying and understanding biological hydrologic systems is discussed. For many years, perhaps too many, hydrology was considered to be that branch of civil engineering devoted to predicting floods and the statistical characteristics of runoff. Botanists and biologists, who might coincidentally be concerned with the flora and fauna of the same watersheds, generally considered the rainfall-runoff response rather well outside their spheres of interest or competence and few, if any, considered themselves to be hydrologists. Soil conservationists offered one of the few bridges between the biological and water portions of the hydrologic system, but even here, botany, hydraulics, and meteorology were associated for a very limited and special purpose, i.e., prevention of erosion, largely on croplands or heavily pastured grasslands. The bio-subsystem is clearly the most important single subsystem on a watershed. There is a need to develop scientific hydrology as a means of modeling the hydrologic system in a way that will permit evaluation of the consequences of decisions with respect to watershed management. (See also W75-03023) (Humphreys-ISWS)
W75-03024

EVALUATING THE EFFECTS OF WATER YIELD MANAGEMENT,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 3B.
W75-03037

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

WATER QUALITY PROBLEMS IN BANGLADESH,
Bangladesh Directorate of Public Health Engineering, Dacca.
For primary bibliographic entry see Field 5G.
W75-02758

THE DESIGN AND APPLICATION OF A MANAGEMENT INFORMATION SYSTEM FOR DRINKING WATER QUALITY DATA,
Philadelphia Water Dept., Pa.
S. Kovacs, J. V. Radziul, R. J. Schoenberger, and I. H. Suffet.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 279-287. 2 fig, 4 ref.

Descriptors: *Water quality, *Data storage and retrieval, *Monitoring, *Water sampling, Deterioration, Computer programs, Pennsylvania, Water quality standards, Corrosion, Water treatment, Public health, Water analysis, Water distribution(Applied), *Pollutant identification.
Identifiers: Philadelphia.

Maintenance of drinking water quality in distribution systems involves complex health, aesthetic, engineering, and management problems. Because of these complex problems, any vigorous study of water quality deterioration necessitates an adequate information management system. Programs and data files were developed to accommodate chemical, physical, and biological information collected at 100 sampling points in the Philadelphia water distribution system. The data file was designed to store up to 30 water quality parameters for each sample as well as location and date information. Six months of data can be stored. Additional files include sample point identification codes, scaling information, valid value limits for each measured quantity, monthly data block identification, and yearly summaries. Fixed formats were used for data input. Programs were developed to input data to check data for outliers and to produce monthly data reports including statistics for each parameter. (See also W75-02751) (Adams-ISWS)
W75-02776

THE POTENTIAL POLLUTION INDEX AS A TOOL FOR RIVER WATER QUALITY MANAGEMENT,
International Reference Centre for Community Water Supply, The Hague (Netherlands).
B. C. J. Zoeteman.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 336-350. 10 fig, 4 tab, 5 ref.

Descriptors: *Pollution abatement, *Gross national product, *Water quality, *Mathematical models, Population, Water pollution, Economics, Rivers, Management, Planning.
Identifiers: Potential pollution index, Rhine River(Germany).

A mathematical approach was proposed for assessing river water quality and for extra-polating essential water and waste treatment levels needed to meet future water quality problems. Basic to the proposed mathematical relationship is an index that depends on the size of a watershed's population and its economic activity. This 'Potential Pollution Index' is defined as the product of watershed population and per capita average GNP value, divided by annual average streamflow. The index does not take into account the effects of wastewater purification nor does it attempt to specifically consider non-point sources of pollution. Tentative general water quality trends in relation to developed pollution indexes were given. The river Rhine was used as a case study in which potential pollution indexes from the year 1850 to 2000 were computed. From the relationships between these indexes and the trend lines for five water quality parameters, time-phased requirements for water and waste treatment processes on the Rhine were given. (See also W75-02751) (Harmeson-ISWS)
W75-02781

GROUND-WATER-QUALITY MONITORING SYSTEMS,
ENWATS, Cambridge, Mass.
R. T. McLaughlin.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 396-415. 3 fig, 12 ref.

Descriptors: *Water quality, *Groundwater, *Monitoring, *Reviews, Data collections, Measurement, Publications, Aquifers, Resistivity, Investigations, Analytical techniques, On-site investigations, Sampling, Hydrogeology, Hydrologic aspects.

A summary of the current state of art in monitoring groundwater quality was developed from a review of published literature, manufacturers information, and field experience. The effects of groundwater use and related activities on the quality were reviewed and the implications for monitoring were considered. The process of monitoring was treated as an attempt to visualize the distribution of each quality constituent throughout the groundwater and the changes in that distribution over time from observations at a limited number of locations at a limited number of times. In this framework, the importance of an adequate hydrogeologic context was emphasized and the problem of an adequate number of points was addressed. The two current monitoring techniques, sampling from observation wells and electrical resistivity measurements, were reviewed in the light of the framework. Some of the problems and strategy of designing a monitoring system were examined. Examples of technological interaction and trade-off in the design of specific components and operations were presented in anticipation of the time when adequate information will make optimal design a possibility. (See also W75-02751) (Humphreys-ISWS)
W75-02787

THE HYDROGRAPHY OF ELKHORN SLOUGH, A SHALLOW CALIFORNIA COASTAL EMBAYMENT,
California State Univ., San Jose. Dept. of Natural Science.
R. E. Smith.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-11020, $4.75 in paper copy, $2.25 in microfiche. Moss Landing Marine Laboratories Technical Publication 73-2, 1973. 88 p, 23 fig, 5 tab, 48 ref, 3 append. NOAA 2-35137.

Descriptors: *Flow characteristics, *Hydrographs, *Ocean circulation, *Nutrients, *Water quality, Chemical analysis, Oceanography, Testing, Instrumentation, Phosphorous compounds, Nitrogen compounds, Pacific Ocean, Tides, Ocean currents, Estuaries, Analytical techniques, Primary productivity, Respiration, Distribution patterns.
Identifiers: *Elkhorn Slough(Calif), *Moss Landing Harbor(Calif), Monterey Bay(Calif).

From October 1970 through February 1972, temperature, salinity, dissolved oxygen, secchi depth, and five major nutrients were observed at approximately monthly intervals at Elkhorn Slough and Moss Landing Harbor. In addition, similar hourly observations were made during two tidal studies during the wet and dry seasons. From the salinity measurements during the summer, a salt balance for Elkhorn Slough was formulated and mean eddy diffusion coefficients were determined. The diffusion model applied to longitudinal phosphate distributions yielded a mean diffusive flux of 12 kg PO4/day (140 micrograms/sq m/day) for the area above the mean tidal prism. Consistent differences, apparently due to differing regeneration rates, were observed in the phosphate and nitrogen distributions. Bottom sediments were proposed as a source for phosphate and as a sink for fixed nitrogen. Dairy farms located along central Elkhorn Slough are apparently a source for reduced nitrogen. During summer, nitrogen was the limiting nutrient for primary production in the upper slough. Tidal observations indicated fresh water of high nutrient concentration consistently entered the harbor from fresh water sources to the south. This source water had a probable phosphate concentration of 40 to 60 micrograms/l and a seasonally varying P:N ratio of 1:16 and 1:5 during the winter and summer, respectively. Net production and respiration rates were calculated from diurnal variations in dissolved oxygen levels observed in upper Elkhorn Slough. Changes in phosphate associated with the variations in oxygen were close to the accepted ratio of 1:276 by atoms. (Henley-ISWS)
W75-02805

STATISTICAL SUMMARY OF AIR-QUALITY DATA FOR METROPOLITAN CLEVELAND, OHIO, 1967-1972: TOTAL SUSPENDED PARTICULATES, NITROGEN DIOXIDE, AND SULFUR DIOXIDE,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
R. B. King, H. E. Neustadter, J. S. Fordyce, J. C. Burr, Jr., and C. L. Cornett.
Available from the National Technical Information Service, Springfield, Va 22161 as TMX-3113, $3.75 in paper copy, $2.25 in microfiche. Technical Memorandum X-3113, October 1974. 34 p, 5 fig, 5 tab, 15 ref, 1 append.

Descriptors: *Air pollution, *Pollutants, On-site data collections, Evaluation, Statistical methods, *Ohio, Air environment.
Identifiers: *Total suspended particulates, *Nitrogen dioxide, *Sulfur dioxide, *Cleveland(Ohio).

Air-quality data for metropolitan Cleveland, Ohio, from 1967 through 1972 were collated and statistically analyzed. Total suspended particulates (TSP), in contrast to previous years, departed from a lognormal distribution in 1972. Nitrogen dioxide and sulfur dioxide, although only somewhat lognormal in previous years, also departed significantly from lognormal distributions in 1972. Ohio standards were not met anywhere in Cleveland for TSP, NO2, and SO2. TSP standards were met at six of seven Lewis-operated western suburban stations, but state-operated suburban stations did not. The data indicate a general improvement in air quality in metropolitan Cleveland: The mean TSP decreasing from 129 to 104 micrograms/cu m; that for NO2 decreasing from 209 to 109 micrograms/cu m; but that for SO2 increasing from 70 to 83 micrograms/cu m. Unusually high precipitation (43% above normal in 1972) may have been the major factor in the lowered numerical values. The mean values of TSP, NO2, and SO2 were 104, 191, and 83 micrograms/cu m, respectively. (Humphreys-ISWS)
W75-02809

SELECTED HYDROLOGIC DATA, SAGEHEN CREEK BASIN NEAR TRUCKEE, CALIFORNIA, 1954-72,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 7C.
W75-02811

THE USE OF A NON-DISPERSIVE ATOMIC FLUORESCENCE SPECTROMETER FOR THE DETERMINATION OF ZINC IN SOILS AND NON-FERROUS METAL ALLOYS,
Imperial Coll. of Science and Technology, London (England). Dept. of Chemistry.
J. D. Norris, and T. S. West.
Analytica Chimica Acta, Vol 71, No 2, p 289-294, August, 1974. 1 fig, 2 tab, 9 ref.

Descriptors: *Zinc, *Soils, *Analytical techniques, Fluorescence, *Alloys, Aqueous solutions, Instrumentation, *Pollutant identification, Soil analysis, *Metals, *Spectrophotometry, Chemical analysis.

The instrumentation for a simple non-dispersive atomic fluorescence spectrometer was described. A detection limit of 0.005 ppm was obtained for the determination of zinc in aqueous solution with this spectrometer and an argon separated air-acetylene flame. A detection limit of 0.001 ppm

was obtained with similar instrumentation incorporating a monochromator. Procedures for the determination of zinc in soils and non-ferrous metal alloys were described. Results were given for the analysis of eight soils containing 0.5-20 ppm of zinc and ten non-ferrous metal alloys containing 0.002-36% of zinc. Since the detection system employed was d.c., maximum sensitivity could not be used for the analysis of these materials because of the significant emission noise of the flame. (Jernigan-Vanderbilt)
W75-02827

PHOTOMETRIC TITRATION OF CHROMIUM (VI) AND VANADIUM (V) IN A MIXTURE,
Bhabha Atomic Research Centre, Bombay (India).
S. V. Parab, S. Syamsundar, and T. K. S. Murthy.
Analytica Chimica Acta, Vol 70, No 2, p 453-456, June, 1974. 1 fig, 1 tab, 9 ref.

Descriptors: *Chromium, *Photometry, *Volumetric analysis, Iron, Acidity, Analytical techniques, *Pollutant identification, Chemical analysis, Spectrophotometry.
Identifiers: *Vanadium.

The photometric titration of a chromium (VI) and vanadium (V) mixture with iron was modified to improve its accuracy and reproducibility, and the results were summarized. It was observed during titrations that after each addition of iron (II) ammonium sulfate, the absorbance increased and then decreased to a steady value. The photometric end-point was located by extrapolation of the absorbance readings obtained before the competing reactions became significant, and was quite sharp. The formal oxidation potentials of the Cr(VI)-Cr(III) and V(V)-V(IV) couples were influenced by acid concentration, and the difference between the potentials appeared to increase with acidity. Phosphoric acid also lowered the redox potential of the Fe(III)-Fe(II) system. All these factors helped to make the end-points sharp and accurate in the photometric titrations. (Jernigan-Vanderbilt)
W75-02828

A CARBON TUBE FOR THE ANALYSIS OF WATER BY FLAMELESS ATOMIC ABSORPTION SPECTROMETRY,
Australian Atomic Energy Commission, Lucas Heights (Australia).
J. F. Chapman, L. S. Dale, and J. W. Kelly.
Analytica Chimica Acta, Vol 69, No 1, p 207-210, March, 1974. 3 fig, 3 ref.

Descriptors: *Analytical techniques, Lead, Cobalt, Water pollution, Metals, Statistics, *Spectrophotometry, *Pollutant identification, *Water analysis.
Identifiers: *Atomic absorption spectrometry.

Flameless atomic absorption spectrometry was investigated for the analysis of natural water samples derived from environmental surveys. A simple flameless atomizer was constructed to enable investigation of electrode dimensions and designs with a view to optimizing the various parameters involved. This resulted in the development of a carbon tube which gave high sensitivity and good reproducibility and was therefore very suitable for water analysis. The final tube design used is reduced in diameter in two places: between the center portion and each end portion. Samples are introduced through a hole in the center section. The cold ends of the carbon tube and the electrode holders act as a shield to prevent light from entering the monochrometer. The positioning of two extreme holes in the tube wall affect sensitivity and memory. Less volatile elements can be determined in concentrations similar to those detected by conventional atomic absorption. Calibration and reproducibility were studied using samples containing lead. (Jernigan-Vanderbilt)
W75-02829

THE OCCURRENCE AND VARIABILITY OF MICROELEMENTS IN THE WATER IN THE LONGITUDINAL SECTION OF THE RIVER NIDA,
Polish Academy of Sciences, Krakow. Zaklad Biologii Wod.
K. Pasternak.
Acta Hydrobiol. Vol 15, No 4, p 357-378, 1973. Illus.
Identifiers: Aquatic organisms, Heavy metals, *Poland(River Nida), Pollution, Rivers, Water chemistry, *Self purification, *Trace elements, *Pollutant identification.

In the water of the River Nida and its clean and polluted tributaries (Poland) the occurrence of the 10 most important microelements and the general chemical composition were investigated in the characteristic periods of the year. The inflow of pollution with the waters of the River Bobrza increases the content of heavy metals, especially of Zn, Cr and Pb in the water of the Czarna Nida and the Nida. The concentration of none of these metals in the water of these 2 rivers exceeds the limits considered as distinctly noxious for aquatic organisms. The self-purification of these rivers from heavy metals, with the exception of Cr, occurs on a sector of about 40 km. Among other factors it is favorably influenced by the admixture of the clean waters of their tributaries. A set-back in the self-purification of the polluted rivers is observed in the winter. A tendency to an increased content of heavy metals in the water is observed with low water levels in the rivers. The content of microelements in the clean tributaries of the Nida, with the exception of Sr, generally corresponds with their content in other clean rivers and chiefly depend on the character of the substratum. In connection with the characteristic geological structure of the catchment basin, the amount of Sr in the water of the whole river network of the Nida is several times higher than in other rivers.--Copyright 1974, Biological Abstracts, Inc.
W75-02831

THE AUTOMATIC SPECTROPHOTOMETRIC DETERMINATION OF MANGANESE (II) AFTER CATION-EXCHANGE CHROMATOGRAPHY,
Government Industrial Research Inst., Nagoya (Japan).
H. Matsui.
Analytica Chimica Acta, Vol 69, No 1, p 216-219, March, 1974. 2 fig, 2 tab, 3 ref.

Descriptors: *Spectroscopy, *Manganese, *Cation exchange, *Automation, Chromatography, Analytical techniques, Metals, Separation, Asia.
Identifiers: Spectrophotometry, Elution, Japan.

A simple method for the automatic determination of trace amounts of manganese (II) after cation-exchange chromatography was reported. In the proposed method, a single eluant containing ammonium chloride and thiocyanate was used. Manganese (II) in the range of 3.0 - 15.0 micrograms can be determined without interference and with a maximum error of 3%. The method can be applied to determinations of maganese in river waters. The automated equipment passes the sample through the ion-exchange column, and when the eluant is applied, passes the eluate, containing magnesium, through mixers after the addition of buffer and zincon to give a yellow color. Manganese (II) can be separated from all other metal ions. (Jernigan-Vanderbilt)
W75-02834

ANTIBIOTIC RESISTANCE AND R FACTORS IN COLIFORM BACILLI ISOLATED FROM HOSPITAL AND DOMESTIC SEWAGE,
Bristol Univ. (England). Dept. of Bacteriology.
K. B. Linton, M. H. Richmond, R. Bevan, and W. A. Gillespie.
Journal of Medical Microbiology, Vol 7, No 1, p 91-103, 1974. 8 tab, 21 ref.

Descriptors: *Coliforms, *Sewers, *Sewage bacteria, *Domestic wastes, Sewage, Investigations, Sampling, *Pollutant identification, *Path of pollutants.
Identifiers: *Hospital wastes, *Antibiotic-resistance-transfer factors(R factor), Bristol(England).

One hundred and one samples from a wide variety of sewers and water drainage channels in Bristol were examined for antibiotic resistant coliform bacilli and for R factors (antibiotic-resistance-transfer factors). Some sewers separately drained hospital and domestic premises. The antibiotic sensitivity patterns of over 3000 coliform bacilli isolated were obtained and 1000 resistant strains were tested for R factor transfer. Hospital sewage contained more coliform bacilli with much higher proportions of resistant bacteria, more R factors, and a greater proportion of R factors carrying multiple resistance, than sewage from domestic and other sources. Despite these findings, it was calculated that less than 5% of the R factors in the sewage output of the City of Bristol originate in hospitals. The normal healthy population appears to be by far the greatest reservoir of R factors in the community. (Merritt-FIRL)
W75-02854

BACTERIAL DEGRADATION OF POLYCHLORINATED BIPHENYLS. I. IDENTIFICATION OF SOME METABOLIC PRODUCTS FROM AROCLOR 1242,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5B.
W75-02859

WATER MONITORING THROUGH CONTINUOUS MEASUREMENT OF SEVERAL PARAMETERS (GEWAESSERUEBERWACHUNG MIT KONTINUIERLICHER MULTIPARAMETER-MESSUNG).
Umwelt, No 5, p 78, October-November, 1973.

Descriptors: *Water quality control, Rivers, *Instrumentation, *Dissolved oxygen analyzers, Analog models, On-site tests, Measurement, Automation, *Pollutant identification.
Identifiers: *West Germany.

Water quality monitoring instruments developed by Rheinmetall GmbH, Dusseldorf, West Germany, for measurement of several parameters in flowing and standing waters, including wastewaters, are described. A buoy-secured instrument is designed for the fully automatic, continuous measurement and recording of temperature, oxygen content, pH value, and electric conductivity in river waters and in moving sea water. The modular system permits extensions for the measurement of additional parameters, and the instrument can be integrated in water quality monitoring networks. Such monitoring networks give alarms whenever specific pollution limit values are exceeded. Another portable, floating instrument with analog recording and digital output measures the same parameters in wastewaters. It can be powered by battery or from mains. (Takacs-FIRL)
W75-02867

AUTOMATED WET CHEMICAL MICROCOULOMETRIC ANALYZER FOR CHLORIDE ION,
California Univ., Riverside. Dept. of Entomology.
D. E. Ott, and F. A. Gunther.
Bulletin of Environmental Contamination and Toxicology, Vol 12, No 2, p 161-166, August, 1974. 3 fig, 6 ref.

Descriptors: *Chlorine, *Analytical techniques, *Pollutant identification, *Aqueous solutions, Water pollution sources, Equipment, Pesticides, Automation, Ions.
Identifiers: Technicon Auto Analyzer, Dohrmann microcoulometric titration modules.

An automated system for the rapid and reproducible analysis of the presence of chloride ion in aqueous solution is described. The apparatus is a combination of a Technicon Auto Analyzer and Dohrmann microcoulometric titration modules. The chloride analyzer is designed to detect chloride ion resulting from the degradation of organochlorine pesticides, but is useful in any analytical situation requiring accurate and rapid analysis of chloride ion. The experimental results showed a mean operation efficiency of 97 plus or minus one percent and 96 plus or minus 3 percent. This chloride analyzer can be used for low-level aqueous chloride ion determinations as long as interferences such as bromide, iodide, and fluoride ions are not present. (Orr-FIRL)
W75-02873

STORM WATER SAMPLING MACHINE,
Greater London Council (England). Dept. of Public Health Engineering.
S. H. Dainty.
Water and Waste Treatment, Vol 16, No 10, p 17, October, 1973.

Descriptors: *Storm water, Instrumentation, *Sampling, Sewers, *Mechanical Equipment, Pollutant identification.
Identifiers: *London(England-UK).

The operation of the stormwater sampling machine being used by the Greater London Council (GLC) is described. The GLC samples the stormwater flows from gravity outlets which are discharged into the Thames at various manned sampling points. The problem of sampling during a storm condition and the subsequent time lapse before the collection of the sample bottles is solved. During a storm flow condition the equipment is actuated for a 15 minute cycle of operation. The sampling pump circulates stormwater from the sewer through a loop and back to the sewer while a small amount of lithium chloride solution is injected into the sewer 120 meters upstream of the sampling point, where it disperses into the stormwater. The sample pump stops, and the loop which is full of fresh stormwater and traces of lithium chloride (the concentration of which enables the stormwater volume and rate of flow to be ascertained) discharges into the first sample bottle. The exact time of sampling is recorded, and the apparatus automatically resets itself. The machine has a capacity of 24 bottles which enables a convenient time schedule for collection and transportation to the laboratories. (Merritt-FIRL)
W75-02876

OZONE AND CHLORINE DEGRADATION OF WASTEWATER POLLUTANTS,
Vermont Univ., Burlington. Water Resources Research Center.
For primary bibliographic entry see Field 5D.
W75-02895

MEASUREMENT OF THE ADSORPTION OF 14C-POLYETHYLENEIMINE POLYMERS DURING FLOCCULATION OF SILICA, BACTERIA AND ALGAE,
Connecticut Univ., Storrs. Inst. of Water Resources.
For primary bibliographic entry see Field 5D.
W75-02913

MERCURY IN SOME CANADIAN ATLANTIC COAST FISH AND SHELLFISH,
Fisheries Research Board of Canada, Halifax (Nova Scotia). Halifax Lab.
H. C. Freeman, D. A. Horne, B. McTague, and M. NcMenemy.
Journal of the Fisheries Research Board of Canada, Vol 31, No 3, p 369-372, 1974. 1 tab, 7 ref.

Descriptors: *Mercury, *Shellfish, *Commercial fish, Heavy metals, Fish, Commercial shellfish, Marine fish, Clams, Oysters, Atlantic salmon, Herrings, Catfishes, Public health, Mussels, Crabs, *Pollutant identification.
Identifiers: Tissue ana¹ysis.

All species of North Atlantic fishes studied, with the exception of two groups of off-shore lobsters, had total mercury levels less than the 0.5 ppm limit allowed for fish of commerce in Canada and the United States. There appeared to be no relationship between mercury levels and the sex and/or weight of fish of any one species. (Katz)
W75-02916

A NEW SHALLOW WATER MULTIPLE-PLATE SAMPLER,
Sabine River Authority of Texas, Orange.
For primary bibliographic entry see Field 7B.
W75-02918

THE DEVELOPMENT OF AN AUTOMATED BIOLOGICAL MONITORING SYSTEM FOR WATER QUALITY,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology; and Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.
J. Cairns, Jr., J. W. Hall, E. L. Morgan, and R. E. Sparks.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 492, $4.25 in paper copy, $2.25 in microfiche. Virginia Water Resources Research Center, Blacksburg. Bulletin 59, Feb 1, 1973. 50 p, 38 ref, 16 fig, 2 tab. OWRT A-039-VA(6) and A-014-KAN(3).

Descriptors: Water quality control, *Water quality, *Bioindicators, *Monitoring, Control systems, *Industrial wastes, Sunfishes, Methodology, *Zinc, Lethal limit, *Pollutant identification.
Identifiers: *Sublethal levels, Biological monitoring system, Zinc sulfate.

A rapid biological monitoring system has been developed which measures changes in the swimming movements and breathing rates of fish. The monitoring system eventually may provide an early warning of developing toxicity in wastes or streams. The monitoring system correctly differentiated an upstream spill of chlorine from a simulated in-plant spill of zinc sulfate. The sensitivity of bluegills to a simulated zinc sulfate soil (introduction of a sublethal concentration of 3mg/l, as zinc) did not decrease after 37 weeks of exposure to a low zinc concentration (0.075 mg/l), indicating that rapid desensitization of fish exposed to industrial waste may not be a problem, at least with wastes that act similarly to zinc. The further development and eventual use of the monitoring system in industrial plants and river basins to maintain water quality for multiple use are discussed. (Katz)
W75-02986

MIREX INCORPORATION IN THE ENVIRONMENT: RESIDUES IN NONTARGET ORGANISMS, 1972,
Alcorn A and M Coll., Lorman, Miss. Dept. of Biology.
Syed M. Naqvi, and Armando A. De La Cruz.
Pestic Monit J, Vol 7, No 2, p 104-111, 1973.
Identifiers: Annelids, Crustaceans, Environment, Fire ants, Fish, Frog, Gas chromatography, Insecticides, Insects, *Mirex, *Mississippi, Mollusks, *Pesticide residues, *Pollutant identification, Path of pollutants.

A total of 78 samples representing 42 sp. of invertebrates, 3 sp. of fish and 1 frog tadpole were randomly collected in 1972 from 5 sampling sites in Mississippi which had received varying degrees of mirex treatment. The samples were analyzed for mirex residues by gas chromatography. Residue levels in most samples were generally less than 1 ppm. Analyses of data provided observations on average residues (ppm) of pooled samples according to the following categories: by type of organism-mollusks (0.15), fish (0.26), insects (0.29), crustaceans (0.44) and annelids (0.63); by habitat-estuary (0.20), lake (0.27), grassland (0.28), creek (0.31) and pond (0.37); by degree of mirex treatment at sampling site-localized treatment on fire ant mound (0.12), no treatment (0.19-0.20), aerial treatment in 1972 (0.33) and aerial treatment in 1968-70 (0.38); and by trophic level-herbivore (0.23), carnivore (0.30), and omnivore (0.35). Mirex residues in animals collected from areas not treated with mirex suggest widespread movement of this pesticide in the environment and the residues observed in the various trophic levels may be indicative of biological magnification.—Copyright 1974, Biological Abstracts, Inc.
W75-03009

ASSESSING EFFECTS ON WATER QUALITY BY BOATING ACTIVITY,
Florida Technological Univ., Orlando, Fla. Coll. of Engineering.
For primary bibliographic entry see Field 5C.
W75-03020

ENVIRONMENTAL APPLICATIONS OF ADVANCED INSTRUMENTAL ANALYSES: ASSISTANCE PROJECTS, FY 73,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
A. L. Alford.
Copy available from GPO Sup Doc as EP1.23:660/2-74-078, $1.00; microfiche from NTIS, Springfield, Va 22161 as PB-238 472; $2.25. Technology Series, EPA Project EPA-660/2-74-078, August 1974. 20 p, 3 fig, 7 tab, 12 ref. 1BA027; Project 16ADN28.

Descriptors: Water pollution sources, Pollutant identification, Analytical techniques, Industrial wastes, Gas chromatography, Mass spectrometry, Neutron activation analysis, Municipal wastes, Information exchange.
Identifiers: GC-MS, Spark source mass spectrometry, Mass spectra computer matching.

The National Water Contaminants Characterization Research Program (now the Analytical Chemistry Branch) of the Southeast Environmental Research Laboratory identified and measured aquatic pollutants under eight projects in answer to requests for assistance. In most cases these analyses helped to solve, or at least to understand more clearly, the related pollution incident and in some cases provided evidence for enforcement of regulatory legislation. Under an additional project, analytical consultations were held as requested by various organizations concerned with pollution incidents. (See also W74-04197 and W73-13662) (EPA)
W75-03041

THE DETERMINATION OF VOLATILE ORGANIC COMPOUNDS AT THE MICROGRAM/L LEVEL IN WATER BY GAS CHROMATOGRAPHY,
National Environmental Research Center, Cincinnati, Ohio.
T. A. Bellar, and J. J. Lichtenberg.
Environmental Monitoring Series, Report EPA-670/4-74-009, November 1974. 26 p, 7 fig, 8 tab, 15 ref, append. EPA 1BA027; ROAP 09ABZ; Task 13.

Descriptors: Solvents, Analytical techniques, *Gas chromatography, Instrumentation, *Organic compounds, Industrial wastes, Water analysis, *Pollutant identification, Aromatic compounds.
Identifiers: *n-Hydrocarbons, Porous polymers, Organohalogen compounds, Aliphatic hydrocarbons.

A quantitative analytical method for the concentration, isolation, and determination of volatile

hydrocarbon and chlorinated hydrocarbon solvents in water is presented. An inert gas is bubbled through the sample to transfer volatile compounds from the aqueous phase to the gaseous phase. These compounds are then concentrated on a porous polymer trap under noncryogenic conditions and determined by gas chromatography using a flame ionization or microcoulometric detector. Details of the design, fabrication, and use of the apparatus are described. The method is applicable to organic compounds that are less than 2% soluble in water and that boil below 150C. Application of the method to the determination of a variety of aliphatic and aromatic hydrocarbons has been demonstrated on several types of water including sewage treatment plant effluents. The lower limit of detection is 0.5 to 1 microgram/l for many compounds. The method is useful over a concentration range of approximately 1 microgram/l to 2500 microgram/l. (See also W75-03041) (EPA)
W75-03043

THE OCCURRENCE OF ORGANOHALIDES IN CHLORINATED DRINKING WATERS,
National Environmental Research Center, Cincinnati, Ohio.
T. A. Bellar, J. J. Lichtenberg, and R. C. Kroner.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-238 589, $2.65 in paper copy; $2.25 in microfiche. Environmental Monitoring Series, Report EPA-670/4-74-008, November 1974. 13 p, 3 fig, 3 tab, 13 ref. EPA 1BA027; ROAP 09ABZ; Task 13.

Descriptors: Water analysis, Chemical analysis, *Chlorination, Potable water, *Water pollution, Gas chromatography, *Pollutant identification, Organic compounds, Analytical techniques, *Methane.
Identifiers: *Organohalogen compounds, *Chlorinated solvents, Organochlorine compounds, *Chloroform, Halogenated methanes.

During the course of the development of an analytical method for the determination of volatile organic solvents in water, it was observed that chloroform and other trihalogenated methanes consistently occur in drinking waters. Water supplies originating from both surface and ground water sources contain these compounds. Investigations reported here show that these compounds result from the water treatment practice of chlorination. They further show that drinking waters having surface water as their source contained higher concentrations of these compounds than those having ground water as their source. The maximum concentrations found were: chloroform--150 microgram/l, bromodichloromethane--20 microgram/l, and dibromochloromethane--2 microgram/l. Application of the method to a sewage treatment plant influent and effluent showed the presence of several other chlorinated aliphatic and aromatic compounds. (See also W75-03043) (EPA)
W75-03044

WATER QUALITY INDEX APPLICATION IN THE KANSAS RIVER BASIN,
National Sanitation Foundation, Ann Arbor, Mich.
N. I. McClelland.
Copy Available from GPO Sup Doc as EP1.23:W29/17, $2.50; microfiche from NTIS Springfield, Va 22161 as PB-238 488; $2.25. Environmental Protection Agency, Report EPA-907/9-74-001, February 1974. 226 p, 10 fig, 13 tab, 16 ref, 9 append. EPA Contract 68-01-0761.

Descriptors: *Water quality standards, River basins, *Surveys, *Pollutant identification, *Monitoring, *Sampling, Kansas, Sites, Regression analysis, Data collections, *Measurement, Chemical properties, Physical properties.
Identifiers: *Kansas River Basin(Kan), Topeka(Kan), Microbiological properties, Water quality index.

The National Sanitation Foundation's (NSF) Water Quality Index (WQI) is an empirical expression which integrates nine significant physical, chemical, and microbiological parameters of water quality into a single number to provide a uniform, consistent, and comprehensible term for measuring and reporting water quality. To demonstrate the responsiveness of WQI to variations in water quality and to determine optimum frequencies for computing and reporting WQI, a comprehensive field sampling, laboratory analysis, and data management program was developed for applying WQI to selected sites on the Kansas River and its major tributaries. Seventeen parameters were measured (the nine in WQI and eight related parameters) on nearly 600 samples from 26 sites (14 main stem and 12 tributary). Parameters most responsible for quality variation in both main stem and tributary stations were identified by lwast squares regression. Results indicated that the NSF Water Quality Index (WQI) is an effective method for measuring and reporting overall quality variations in the Kansas River. (EPA)
W75-03047

ION SELECTIVE MEMBRANE ELECTRODES FOR WATER POLLUTION MONITORING,
State Univ. of New York, Buffalo. Dept. of Chemistry.
G. A. Rechnitz.
Copy Available from GPO Sup Doc as EP1.23:660/2-74-079, $0.80; microfiche from NTIS Springfield, Va 22161 as PB-238 490; $2.25. Environmental Protection Agency, Technology Series report EPA-660/2-74-079, August 1974. 24 p, 11 ref. EPA Program Element 1BA027. R-800991.

Descriptors: *Carbonates, *Chemical analysis, Cadmium, Copper, *Electrodes, Halides, *Ion exchange, Lead, Monitoring, Pollutant identification, Sulfates, Measurement, Ions, Heavy metals, Nitrilotriacetate, Membranes, Analytical techniques.
Identifiers: *Ion selective electrodes, Microelectrodes, Association constants, Complexes, Silver, Continuous flow, Flow-through electrodes.

Under this project, new ion-selective electrodes were developed for several ions not previously accessible to electrode measurement. In addition, new electrode configurations were constructed and evaluated in terms of suitability for monitoring purposes. Specifically, a liquid membrane electrode for carbonate and a solid membrane electrode for sulfate were devised. The properties of these electrodes were evaluated and found to be useful for measurements in water systems. Both micro and flow-through electrodes for a number of ions were constructed and tested. Particular success in this connection was achieved for sensors responsive to the halide and heavy metal ions. Electrodes were applied to the measurement of NTA in waters and the study of ion association. (EPA)
W75-03048

ON-STREAM ATOMIC-ABSORPTION DETERMINATION OF ZINC AND MANGANESE IN FLOTATION LIQUORS CONTAINING CALCIUM SULPHATE,
Commonwealth Scientific and Industrial Research Organization, Port Melbourne (Australia). Div. of Mineral Chemistry.
M. H. Jones, and J. T. Woodcock.
Analytica Chimica Acta, Vol 69, No 2, p 275-286, April, 1974. 6 fig, 2 tab, 7 ref.

Descriptors: *Zinc, *Manganese, *Flotation, *Analytical techniques, *Mineral industry, Calcium, Inorganic compounds, Minerals, Testing procedures, Aqueous solutions, Spectroscopy, Mills, Waste water treatment, Industrial wastes, *Pollutant identification.
Identifiers: Atomic absorption spectroscopy.

The development of a technique to cope with interference caused by calcium sulfate present in flotation plant liquors was described. The results showed that manganese and zinc, and probably other metals, could be determined continuously by atomic absorption spectrometry in a plant liquor containing calcium sulfate provided that disodium EDTA is added at controlled pH(about 7). At least three hours of continuous operation could be obtained before burner salt-up occurred, but efforts could be directed to increase this time operation. EDTA has little effect on the absorbance values. (Jernigan-Vanderbilt)
W75-03059

RELATIVE EFFICIENCY OF SEVERAL ATOMIZATION AND SAMPLE INTRODUCTION SYSTEMS IN ANALYTICAL ATOMIC SPECTROMETRY,
California Inst. of Tech., Pasadena. Dept. of Chemistry.
M. K. Murphy, and C. Veillon.
Analytica Chimica Acta, Vol 69, No 2, p 295-303, April, 1974. 4 tab, 21 ref.

Descriptors: *Analytical techniques, *Trace elements, *Copper, *Spectroscopy, *Sampling, Laboratory tests, Testing procedures, Instrumentation, *Pollutant identification.
Identifiers: Atomic absorption spectroscopy.

The objective was to compare, under controlled conditions and using the same apparatus, several flame atomization systems, both commercially available designs and versions constructed in the authors' laboratory. Both atomic emission and atomic absorption measurements were made and the basis of comparison was to be the minimum amount of an easily determined element that could be detected. Several types of chemical flames and burner designs were investigated, employing direct pneumatic, indirect pneumatic, ultrasonic, and solventless sample introduction systems. A heated graphite rod atomization system was also investigated, with both direct placement of small sample volumes on the rod and continuous sample introduction. Detection limits were compared on an absolute basis for copper. Remarkably similar detection limits were obtained but the heated graphite atomizers offered significantly lower minimum detectable quantities. (Jernigan-Vanderbilt)
W75-03060

TRACE METALS AND TOXICITY.
For primary bibliographic entry see Field 5C.
W75-03064

DETERMINATION OF LEAD IN PAINT WITH FAST NEUTRONS FROM A CALIFORNIUM-252 SOURCE,
National Bureau of Standards, Washington, D.C. Activation Analysis Section.
G. J. Lutz.
Analytical Chemistry, Vol 46, No 4, p 618-620, April, 1974. 2 fig, 2 tab, 5 ref.

Descriptors: *Lead, *Analytical techniques, *Neutron activation analysis, *Automation, Paints, Tracers, Testing procedures, Instrumentation, *Pollutant identification.
Identifiers: *Californium-252.

The use of Californium-252 in determining trace amounts of lead in paint on walls was studied. It could be utilized in instrumental activation analysis as a relatively inexpensive irradiation source and would dispense with lengthy chemical treatments and have the potential for largely automating the determination. The results of an experiment indicated that with a Cf-252 source of several tens of milligrams and the 60cc Ge(Li) detector, the determination of about 1% of lead in a sample of 1-2 grams of paint could be accomplished with a 15-minute irradiation and 15-minute counting. The

potential exists for largely automating the irradiation and counting of a large number of samples, and although the initial cost of equipment for this determination would be greater than for alternate methods, the speed and adequate reliability of the isotope source would make it economically competitive. (Jernigan-Vanderbilt)
W75-03065

DIRECT DETERMINATION OF HEAVY ELEMENTS IN BIOLOGICAL MEDIA BY SPARK SOURCE MASS SPECTROMETRY,
North Carolina Univ., Chapel Hill. Dept. of Pathology.
A. W. Fitchett, R. P. Buck, and P. Mushak.
Analytical Chemistry, Vol 46, No 6, p 710-713, May, 1974. 4 fig, 1 tab, 16 ref. UNCMRC(DAHC-15-67-CO223).

Descriptors: *Organic matter, *Heavy metals, *Mass spectrometry, *Analytical techniques, Silver, Mercury, Lead, Laboratory tests, Testing procedures, Trace elements, *Pollutant identification.

The analysis of trace heavy elements in biological media by spark source mass spectrometry was studied. The direct analysis of serum, homogenized liver, and urine was accomplished without prior ashing. It was found that by proper control of the sparking parameters, organic interferences can be held to the lower mass range, thus leaving the higher range free from such interfering ions. The elements studied were Pt, Au, Hg, Tl, Pb, and Bi. Through the use of an internal image developer and elemental calibration curves, concentrations below 1 ppm were determined from single exposures. Unique sampling procedures and feasibility as a routine pathological tool are discussed. (Jernigan-Vanderbilt)
W75-03066

APPLICATION OF THE CARBON ROD ATOMIZER TO THE DETERMINATION OF MERCURY IN THE GASEOUS PRODUCTS OF OXYGEN COMBUSTION OF SOLID SAMPLES,
Montana State Univ., Bozeman. Dept. of Chemistry.
D. Siemer, and R. Woodriff.
Analytical Chemistry, Vol 46, No 4, p 597-598, April, 1974. 2 fig, 5 ref.

Descriptors: *Mercury, *Analytical techniques, *Organic matter, Spectroscopy, Experiments, Instrumentation, Testing procedures, Laboratory tests, Coal, Burning, *Pollutant identification.
Identifiers: *Sample preparation, Atomic absorption spectroscopy.

Atomic absorption analysis for mercury is usually accomplished by adding a reducing agent to a digestate and sweeping the evolved atomic mercury out of the solution into a cold vapor absorption tube or flame by means of a gas bubbled through the system. The approach described was to burn the samples completely in a modified combustion tube, to collect the evolved mercury on the inner surface of a porous, gold plated, carbon rod atomizer tube, and finally, to measure the atomic absorption when the tube is heated in the normal fashion. It was concluded that this technique of combining the sensitivity and ease of operation of the carbon rod type of atomizer with the straightforward combustion of organic samples has resulted in an analytical system which gives good results for mercury in a wide range of organic matrices. (Jernigan-Vanderbilt)
W75-03067

LIQUID-LIQUID EXTRACTION OF ZINC WITH ALIQUAT 336-S-1 FROM AQUEOUS IODIDE SOLUTIONS,
Texas Southern Univ., Houston. Dept. of Chemistry.
C. W. McDonald, and T. Rhodes.
Analytical Chemistry, Vol 46, No 2, p 300-301, February, 1974. 2 tab, 5 ref. AEC(AT-(40-1)-1452).

Descriptors: *Cadmium, *Zinc, *Separation techniques, Pollution abatement, Industrial wastes, Trace elements, Aqueous solutions, *Analytical techniques, Chemicals, *Pollutant identification.
Identifiers: *Aliquat 336-S-1.

The extraction behavior of zinc from aqueous iodide solutions with Aliquat 336-S and xylene was investigated, and the results were compared with similar investigations with mercury and cadmium to ascertain any periodic trends in the zinc family. In addition, a method was developed for separating cadmium from zinc which was rapid, simple, quantitative, and used very inexpensive chemicals. The method is based on the selective stripping of zinc from the organic phase with an aqueous solution of Na2SO3. It therefore shows some promise for large scale industrial use. It can also be used to make the separation on the laboratory scale. (Jernigan-Vanderbilt)
W75-03068

THE ANALYSIS OF SLAG FOR COPPER, TOTAL IRON, IRON (II), AND IRON (III) BY TITRATION, CONTROLLED POTENTIAL COULOMETRY AND ELECTRODEPOSITION,
Henry Krumb School of Mines, New York.
R. L. Altman.
Analytica Chimica Acta, Vol 63, p 129-138, 1973. 1 fig, 7 tab, 5 ref.

Descriptors: *Potentiometers, *Iron, *Electrodes, *Copper, *Separation techniques, Volumetric analysis, Reduction(Chemical), Oxidation, Chemical precipitation, Analytical techniques, *Pollutant identification.
Identifiers: Slags.

The interference of copper in the titrimetric determination of iron (II), iron (III) and total iron in slags is discussed. The titration of iron (II) suggested by Bowen and Schairer (1932) is accurate and can be conducted with a reproducibility of plus or minus 0.29% at the 95% confidence level. Electrolytic copper-iron separation techniques were adapted to copper-containing iron-silicate slag, to obtain a reliable method for copper and total iron analysis. The theoretical and practical limitations for performing potentiostatic determinations of iron (III) in copper-containing slag are reviewed. Some determinations were made but initial results were unreliable. Complete analysis of copper-gold alloys were made potentiostatically. Copper plus gold recoveries were ea. 99.8%. (Rowe-Vanderbilt)
W75-03069

CADMIUM, ZINC, COPPER AND LEAD IN HUMAN RENAL CORTEX,
Karolinska Institutet, Stockholm (Sweden). Dept. of Environmental Hygiene.
M. Piscator, and B. Lind.
Archives of Environmental Health, Vol 24, No 6, p 426-431, June, 1972. 5 fig, 3 tab, 12 ref.

Descriptors: *Trace elements, *Zinc, *Copper, *Lead, *Human pathology, *Cadmium, Analytical techniques, Spectroscopy, Distribution patterns, *Pollutant identification.
Identifiers: *Sweden.

The primary objective was to obtain an impression of the amount of cadmium and zinc in the kidneys of Swedish subjects. Lead and copper were also assayed in some of the subjects. Analysis of cadmium and zinc in the renal cortex of 67 Swedish subjects disclosed the same dependence on age as in U.S. subjects. In the 6-50 year age group, cadmium content and the cadmium-zinc ratio were correlated to age; thereafter, there was a decrease in cadmium and zinc and in the cadmium-zinc ratios. The increase in zinc paralleled the increase in cadmium. The difference between total zinc and the amount of zinc equivalent to the amount of cadmium provides a measure of the physiological zinc content of the cortex; this fraction, 160 ppm (based on dry weight of renal cortex), did not vary with age. In the age groups over 60, cadmium content was significantly lower in women than in men. (Jernigan-Vanderbilt)
W75-03071

DIRECT POTENTIOMETRIC DETERMINATION OF CALCIUM IN WATERS WITH A CONSTANT COMPLEXATION BUFFER,
Warsaw Univ. (Poland). Inst. of Fundamental Problems in Chemistry.
A. Hulanicki, and M. Trojanowicz.
Analytica Chimica Acta, Vol 68, No 1, p 155-160, January, 1974. 2 tab, 7 ref.

Descriptors: *Calcium, *Analytical techniques, *Potentiometers, Instrumentation, Ions, Ion-exchange, *Pollutant identification, *Water analysis.

The effect of the composition of solutions in the direct potentiometric determination of total calcium content with an Orion calcium-selective electrode was investigated. In order to obtain accurate results for water samples, it was necessary to add ammonium buffer (0.02M) to maintain constant pH, potassium nitrate (0.4M) for constant ionic strength, iminodiacetic acid (0.02M) for constant complexation of calcium, and acetylacetone (0.04M) to mask magnesium. In the presence of the proposed constant complexation buffer (CCB), the results were accurate to within a few percent in the range 20-8000 mg Ca/1. (Jernigan-Vanderbilt)
W75-03072

SEPARATION AND DETERMINATION OF TIN BY LIQUID-SOLID CHROMATOGRAPHY,
Ames Lab., Iowa.
J. S. Fritz, and L. Goodkin.
Analytical Chemistry, Vol 46, No 7, p 959-962, June, 1974. 3 fig, 2 tab, 22 ref.

Descriptors: *Chromatography, *Analytical techniques, *Separation techniques, Instrumentation, Spectroscopy, Testing procedures, Metals, *Pollutant identification.
Identifiers: *Tin.

A separation method was reported based on selective sorption of tin (IV) by a macroporous, polyacrylate resin containing amide functional groups. Tin is detected spectrophotometrically at 225 nm by allowing the eluate stream to pass through a flow-through cell mounted in a visible-UV spectrophotometer. The amount of tin is obtained from a linear calibration plot of peak height versus microgram of tin. This method has several advantages over most other separation methods for tin: (1) the resin is selective for tin under the conditions used; (2) tin is eluted from the resin under mild conditions whereas in other methods, eluents such as 9N sulfuric acid or hydrochloric acid mixtures are used; (3) because there is no liquid phase coated on the resin as in liquid-liquid chromatography, there is no phase-bleeding problem; (4) Tin is detected automatically; (5) the separation of tin from other metals is rapid (5 to 6 minutes). (Jernigan-Vanderbilt)
W75-03075

CHROMATOGRAPHIC SEPARATION OF METAL IONS ON LOW CAPACITY MACRORETICULAR RESINS,
Ames Lab., Iowa.
J. S. Fritz, and J. N. Story.
Analytical Chemistry, Vol 46, No 7, p 825-829, June 1974. 8 fig, 2 tab, 15 ref.

Descriptors: *Metals, *Separation techniques, *Chromatography, *Ion exchange, Resins, Cations, Calcium, Magnesium, Zinc, Lead, Copper,

Manganese, Nickel, Testing procedures, Laboratory tests, Heavy metals, Analytical techniques, *Pollutant identification.

The new lower capacity partially-sulfonated cation-exchange resins were used for a number of rapid chromatographic separations of metal ion mixtures. A few, selected separations applied to forced flow chromatography were reported. Separations of thorium (IV) from lanthanum (III); thorium (IV) from zirconium (IV); calcium (II) from magnesium (II); zinc (II), lead (II), copper (II), manganese (II), and nickel (II) from each other, and a separation of lead (II) from large amounts of other divalent ions were demonstrated. Low-capacity resins provide rapid separations in strongly acidic eluents of moderate concentrations. In-stream addition of color-forming reagent prior to passage through a spectrophotometer provides continuous detection and accurate quantitation of eluted metals with a 1-2% error. (Jernigan-Vanderbilt)
W75-03076

LEAD SEPARATION BY ANODIC DEPOSITION AND ISOTOPE RATIO MASS SPECTROMETRY OF MICROGRAM AND SMALLER SAMPLES,
National Bureau of Standards, Washington, D.C. Analytical Chemistry Div.
I. L. Barnes, T. J. Murphy, J. W. Gramlich, and W. R. Shields.
Analytical Chemistry, Vol 45, No 11, p 1881-1884, September, 1973. 5 tab, 8 ref.

Descriptors: *Lead, *Mass spectrometry, *Analytical techniques, Spectrometry, Laboratory tests, Measurement, Water pollution, *Pollutant identification.
Identifiers: Measurement of pollution.

A method is reported for the separation by anodic deposition and subsequent analyses by isotope ratio mass spectrometry of small samples of lead from a variety of matrices. The combined procedure is applicable to samples containing from 10 micrograms to less than 10 ng of lead and the electrodeposition is more than 95% efficient at these levels. Only a few elements interfere with the deposition, most notably iron and cerium, and procedures for removing the interfering elements are given. The optimum conditions for the anodic deposition of lead as Pb02 were studied. The mass spectrometric procedure described permits a precision of 0.1% (95% limit of error) or better for the measured isotopic ratios. (Jernigan-Vanderbilt)
W75-03077

ACCUMULATION OF MIREX RESIDUES IN SELECTED ORGANISMS AFTER AN AERIAL TREATMENT, MISSISSIPPI, 1971-72,
Mississippi State Univ., State College. Dept. of Zoology.
James L. Wolfe, and B. R. Norment.
Pestic Monit J. Vol 7, No 2, p 112-116, 1973.
Identifiers: Biological studies, Crayfish, Fish, Insecticides, Invertebrates, Mammals, *Mirex, *Mississippi, Streams, *Pesticide residues, *Pollutant identification, Path of pollutants.

Mirex residues were monitored in selected organisms in Mattubby Creek Watershed, Monroe County, Mississippi, for approximately 1 yr following an aerial application of IX mirex bait (0.85 g/acre). Although there was an increase in residues in crayfish, levels remained relatively low in invertebrates as compared to those previously reported. Fishes from streams in the treated areas showed an increase in residues of about 2-20 times over controls taken from an adjacent watershed. These levels in stream fishes remained relatively constant for 7 mo. after treatment, when the last sample was taken. Residue levels in mammals were obviously stratified according to food habits. Strict herbivores had the lowest levels, omnivores intermediate levels and insectivore-carnivores the highest levels. Generally, the residues detected were lower than those previously reported and presumably reflected the lower rate of mirex application (1X rate vs. the normal 4X or 2X rate). The compound was concentrated by certain nontarget organisms even at this low rate of application and stratified by trophic level.--Copyright 1974, Biological Abstracts, Inc.
W75-03079

SPECTROPHOTOMETRIC DETERMINATION OF PETN IN WASTE WATER FROM LEAD STYPHNATE PRIMER PLANTS,
Frankford Arsenal, Philadelphia, Pa.
G. Norwitz, and H. Gordon.
Available from the National Technical Information Service, Springfield Va 22161 as AD-769 606, $3.25 in paper copy, $2.25 in microfiche. Test Report T73-10-1, September, 1973. 25p, 3 tab, 30 ref.

Descriptors: *Analytical techniques, *Spectroscopy, *Industrial wastes, Lead, Waste water, Laboratory tests, Testing procedures, *Organic compounds, *Pollutant identification, Industrial plants.
Identifiers: *Pentaerythritol tetranitrate, Lead styphnate primer plant.

An accurate spectrophotometric method was proposed for the determination of pentaerythritol tetranitrate (PETN) in waste water from lead styphnate primer plants by use of phenoldisulfonic acid. The waste water was filtered through a sintered glass crucible and the PETN was determined and the residue. In determination of PETN in the filtrate, sodium hydroxide was added and the PETN was extracted with methylene chloride (in alkaline solution, styphnate and TNT were not extracted). The methylene chloride solution was then evaporated to dryness, the residue was treated with a solution of phenoldisulfonic acid in sulfuric acid, water and ammonia were added, and the yellow color was measured. In the determination of PETN in the residue, the PETN was dissolved in acetone, an aliquot of the acetone solution was treated with water and sodium hydroxide, the PETN was extracted with methylene chloride, and the color was developed as above. Various factors affecting the determination were investigated. The solubility of PETN in water was studied. (Jernigan-Vanderbilt)
W75-03081

APPLICATION OF CELL ANALYSIS AND SORTING TECHNIQUES TO DISEASE DETECTION (RAPID DIFFERENTIAL DIAGNOSIS OF NEWCASTLE DISEASE VIRUS),
Los Alamos Scientific Lab., N. Mex.
L. S. Cram.
Informal Report LA-5565-MS, February 1974. 5 p, 1 fig, 8 ref. W-7405-ENG. 36.

Descriptors: *Viruses, Biocontrol, *Diseases, Public health, Poultry, *Pollutant identification, Analytical techniques, *Cytological studies, *Bioassay, *California.
Identifiers: *Newcastle disease, Cell analysis, Diagnosis, Cell fusion, Flow microfluorometry.

Six strains of Newcastle Disease Virus (NDV) were studied utilizing flow microfluorometry (FMF), a new cell analysis and sorting instrument for disease detection. The rapid differential assay technique requires only 2-3 days to complete, a savings of 4-8 days over the plaque assay normally utilized to differentiate velogenic strains of NDV. Such a reduction is especially important in cases of new and more virulent strains which have produced death in less than six days. Of the six NDV field strains from California studied utilizing the FMF technique which determines their relative capacity to cause cell fusion, three were found to induce cell fusion to a degree that confirmed their high virulence in the field. One strain producing little fusion was later identified as having probably originated as a vaccine strain. The two strains yielded results not conforming with the field diagnosis. The ambiguous results were due to the presence of more than one virus strain. To counter this problem, a rapid technique to enrich the sample for the most velogenic strain present must be developed. A cell fusion index relating to FMF data is also required to assist discussions of the fusion data in quantitative terms. (Schroeder-Wisconsin)
W75-03126

SIMPLE DEVICE FOR AUTOMATICALLY TRANSFERRING BROTH CULTURES,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 7B.
W75-03136

REVIEW OF THE RESULTS FROM THE EASTERN ATLANTIC CONTINENTAL MARGIN PROGRAM OF THE INTERNATIONAL DECADE OF OCEAN EXPLORATION,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 2L.
W75-03139

CHARACTERISTICS OF STREAMFLOW AND GROUNDWATER CONDITIONS IN THE BOISE RIVER VALLEY, IDAHO,
Geological Survey, Boise, Idaho.
For primary bibliographic entry see Field 2E.
W75-03151

MATHEMATICAL GENERALIZATION OF STREAM TEMPERATURE IN CENTRAL NEW ENGLAND,
Geological Survey, Boston, Mass.
For primary bibliographic entry see Field 2K.
W75-03157

HYDROGRAPHIC OBSERVATIONS FROM A NATURAL MARSH AND A MARSH ALTERED BY DREDGING, BULKHEADING, AND FILLING IN WEST BAY, TEXAS,
Corps of Engineers, Galveston, Tex.
E. J. Pullen.
NOAA National Marine Fisheries Service Data Report 97, October 1974. 15 p, 1 fig, 13 tab, 9 ref. (Also as NOAA, National Marine Fisheries Service, Gulf Coastal Fisheries Center Contribution No 383.)

Descriptors: *Estuaries, *Bays, *Dredging, *Marshes, Water quality, Canals, Channel improvement, Hydrography, *Texas, Data collections, Hydrologic data, Surveys, *Pollutant identification.
Identifiers: Hydrographic data, *Bulkheading, Channelization, Environmental surveys, West Bay(Tex).

Hydrographic data were collected from a natural marsh and a marsh altered by dredging, bulkheading, and filling in West Bay, Texas. Water samples were taken at 2-wk intervals during the day and night at 10 stations from 25 March to 21 October 1969. This report contains the location, depth, data, and time the samples were taken and corresponding measurements of water temperature, salinity, dissolved oxygen, dissolved organic nitrogen, nitrite, total phosphorus, inorganic phosphate-phosphorus, pH, carbon dioxide, total alkalinity, carbonate alkalinity, and turbidity. (NOAA)
W75-03175

MARINE STUDIES OF SAN PEDRO BAY, CALIFORNIA. PART VII. SEDIMENT COMPOSITIONS IN LOS ANGELES-LONG BEACH HARBORS AND SAN PEDRO BASIN,
University of Southern California, Los Angeles. Environmental Engineering.
For primary bibliographic entry see Field 5B.
W75-03176

ASBESTOS IN DRINKING WATER,
Vermont State Dept. of Health, Burlington. Div. of Environmental Health.
H. E. Sargent.
Journal of the New England Water Works Association, Vol 88, No 1, p 44-57, March 1974. 1 tab, 5 ref.

Descriptors: *Asbestos, *Potable water, *Vermont, *Public utilities, *Municipal water, Investigations, Water pollution, Water pollution sources, Pipes, Erosion, Sedimentation, *Pollutant identification.
Identifiers: *Asbestos cement pipes.

Asbestos fibers were found by light microscopy to be present in 30 of 32 water systems tested in Vermont. Generally, there is an increase in fiber count from source to distribution but it is not known whether the fiber increase is due principally to breaking apart, concentration through sedimentation, erosion of asbestos cement pipe, or field tapping asbestos cement pipe. There is no conclusive evidence to date incriminating asbestos in water as a health hazard at presently known levels. Where flushing of the system was instituted following sampling, the fiber count was substantially reduced. There is a need for more research to establish if or at what concentration of fiber a hazard to health exists. A standard procedure for identification and quantifying asbestos in drinking water is needed. (Merritt-FIRL)
W75-03190

METHOD AND APPARATUS FOR MEASURING PARTICLE CONCENTRATION IN A FLUID SUSPENSION OF PARTICLES,
For primary bibliographic entry see Field 7B.
W75-03204

INTERNATIONAL JOURNAL OF MEDICAL OCEANOGRAPHY SUPPLEMENT. MARINE POLLUTIONS AND SHORELINE MANAGEMENT,
For primary bibliographic entry see Field 5B.
W75-03207

OIL POLLUTION IN THE IZU ISLANDS WATERS, (IN JAPANESE),
Tokyo Metropolitan Fisheries Experiment Station (Japan).
For primary bibliographic entry see Field 5B.
W75-03209

TOTAL PHOSPHORUS ANALYSIS: PERSULFATE OR ASHING,
Havens and Emerson, Ltd., Cleveland, Ohio.
K. Gupta, and A. E. Zanoni.
Water and Sewage Works, Vol 121, No 7, p 74-77, July 1974. 5 fig, 17 ref.

Descriptors: *Phosphorus, *Oxidation, *Hydrolysis, *Pollutant identification, Colorimetry.
Identifiers: Total phosphorus analysis, *Persulfate method, *Dry ashing method, Sulfuric acid, Percholic acid digestion, Eutectic melt, Environmental Protection Agency.

A combination of oxidation (using potassium persulfate, K2SO8) as an oxidizing agent and hydrolysis of the sample in an acid medium followed by a colorimetric determination of phosphorus is a new method for analyzing phosphorus. In another technique, KN03-NaN03 eutectic melt is utilized, while still another employs 50 percent hydrogen peroxide solution. Harwood compared five oxidation procedures for total phosphorys analysis. A procedure was developed by Harvey which samples are acid hydrolyzed under pressure with an autoclave at 140 C for 5 hours. In the persulfate method, 10 ml of standard solution was oxidized with different amounts of K2S08 using 30 percent sulfuric acid,and adding distilled water to increase the volume to 50 ml. In the dry ashing method, 10 ml of standard solution was treated with a volume of 13.67 percent MgC12.6H20 solution, then evaporated to dryness on a steam table. (Leibowitz-FIRL)
W75-03221

DETERMINATION OF FENITROTHION, PHOSPHAMIDON AND DIMETHOATE IN NATURAL WATER,
Canada Centre for Inland Waters, Burlington (Ontario).
B. D. Ripley, J. A. Hall, and A. S. Y. Chau.
Environmental Letters, Vol 7, No 2, p 97-118, 1974. 4 fig, 6 tab, 16 ref.

Descriptors: *Organophosphorus pesticides, Forest management, Natural waters, Separation techniques, Water pollution sources, *Pollutant identification, Phosphorus compounds, *Analytical techniques, Solvent extractions.
Identifiers: *Fenitrothion, *Dimethoate, *Phosphamidon, Serial solvent extraction, GLC analysis.

Fenitrothion, phosphamidon and dimethoate are organophosphorus pesticides being used for the protection of Canadian forests from defoliators. A method for determining residues of these chemicals in natural waters was investigated. Because fenitrothion and phosphamidon were not resolved on several GLC columns used in the laboratory, the separation was accomplished through serial solvent extraction using different solvents before GLC analysis. The step of solvent partitioning serves to a certain extent as confirmation of the identity of the pesticide. Storage effects on these pesticides in distilled and natural waters were elucidated. Only 0.01 ppb of fenitrothion and dimethoate and 0.05 of phosphamidon in one liter of water is determinable. (Leibowitz-FIRL)
W75-03222

BIOLOGY AND HEALTH PHYSICS DIVISION, PROGRESS REPORT OF ENVIRONMENTAL RESEARCH BRANCH, JULY 1 TO SEPTEMBER 30, 1973,
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
For primary bibliographic entry see Field 5B.
W75-03233

COLLABORATIVE TESTS OF WATER ANALYSIS (THE CHEMAQUA PROGRAMME): I. SODIUM, POTASSIUM, CALCIUM, MAGNESIUM CHLORIDE, SULPHATE, BICARBONATE, CARBONATE, AND CONDUCTIVITY,
Department of Scientific and Industrial Research, Lower Hutt (New Zealand). Chemistry Div.
M. Kingsford, C. D. Stevenson, and W. H. L. Edgerley.
N Z J Sci, Vol 16, No 4, p 895-902, 1973.
Identifiers: Calcium, Carbonates, Bicarbonates, Chemaqua program, Chlorides, Conductivity, Control, Magnesium, *New Zealand, Pollution, Potassium, Sodium, Sulfates, *Water analysis, *Laboratory tests, *Pollutant identification.

Sixteen New Zealand laboratories analyzed 2 water samples for a range of inorganic constituents. The methods used to determine carbonate were unsatisfactory, and a better method is needed to analyze for low levels of sulfate. The total errors for the remaining estimates were < 25%, and the estimations could be rated as excellent, the most precise being that of conductivity.--Copyright 1974, Biological Abstracts, Inc.
W75-03268

OIL POLLUTION MONITORING IN THE LAGOON OF VENICE USING THE MUSSEL MYTILUS GALLOPROVINCIALIS,
Istituto di Biologia del Mare, Venice (Italy).
V. U. Fossato, and E. Siviero.
Mar Biol (Berl), Vol 25, No 1, p 1-6, 1974, Illus.
Identifiers: Chromatography, *Italy(Lagoon of Venice), Lagoons, *Monitoring, *Mussels, Mytilus-galloprovincialis, *Oil pollution, *Gas chromatography, *Bioindicators, *Pollutant identification.

Gas chromatographic analyses of mussels, M. galloprovincialis, from different areas of the Lagoon of Venice, Italy, show that these organisms contain a very complex mixture of hydrocarbons attributable to fuel oil contamination. The measured amounts normally range from 0.8-8.7 mg/100 g wet weight, but values as high as 22.0 mg/100 g have been recorded. This high value indicates a saturation limit for these organisms which is considerably higher than those values normally found in mussels from the lagoon. The aliphatic hydrocarbon levels in mussels are related to distance from pollution sources and to the degree of exchange between the sea and the area sampled. This relationship between overall hydrocarbon pollution load and level of contamination of M. galloprovincialis suggests that this bivalve might be effectively utilized as a self-integrating monitoring index of oil pollution in the waters of the lagoon.--Copyright 1974, Biological Abstracts, Inc.
W75-03269

INTERFERENCE-FREE TRACE ELEMENT ANALYSIS OF WATER, BIOLOGICAL SPECIMENS AND FOOD SOURCES BY MEANS OF NUCLEAR TECHNIQUES,
Aktiebolaget Atomenergi, Studsvik (Sweden).
D. Brune.
Sci Total Environ Vol 2, No 1, p 111-115, 1973.
Identifiers: Biological specimens, Environmental studies, Food, Pollution, *Trace elements, *Methodology, *Pollutant identification, *Analytical techniques, *Neutron activation analysis.

A survey is given of methods for the interference-free determination of (pollutant) trace elements in water, biological specimens and food sources by means of neutron activation analysis involving the use of a cold neutron irradiation procedure. The technique finds applications in e.g., environmental control, and in medical, biological and oceanographic research. Activation analysis achieved by cold irradiation techniques, in combination with microtomy permits evaluation of the distribution of various elements in tissue sections.--Copyright 1974, Biological Abstracts, Inc.
W75-03283

COMPARISON OF THE RESULTS OF BACTERIOLOGICAL WATER INVESTIGATIONS, (IN SWEDISH),
Laboratoriet Goteborgs Vatten-Avloppsverk, Goteborg (Sweden).
I. Aronsson, and T. Nemeth.
Vatten. Vol 29, No 3, p 238-246, 1973, Illus.
Identifiers: Bacteria, *Bacteriological studies, *Coliforms, Counting, Pollution, *Sweden, *Potable water, *Filters(Diaphram), Methodology, *Pollutant identification.

Results of coliform bacteria counts in drinking water, performed by the time-consuming standard test tube method, and by a new, rapid method using diaphragm filters, are compared. Good agreement between the results obtained by the 2 different methods was determined. The diaphragm filter method was more sensitive than the standard method for pure water with coliform bacteria counts less than 20/100 ml. The diphragm filter method was introduced in the routine bacteriological investigation of drinking water at waterworks in Sweden.--Copyright 1974, Biological Abstracts, Inc.
W75-03292

STUDY OF THE BEHAVIOR OF COPPER ION-SELECTIVE ELECTRODES AT SUB-MICROMOLAR CONCENTRATION LEVELS,
Wisconsin Univ., Madison. Dept. of Chemistry.
W. J. Blaedel, and D. E. Dinwiddie.
Analytical Chemistry, Vol 46, p 873-877, June 1974. 7 fig, 1 table, 9 ref. OWRT A-053-WIS(1). 14-31-0001-4050.

Descriptors: Design, *Electrodes, Ions, *Electrochemistry, Water pollution, Membranes, Chemistry, Water purification, *Pollutant identification, Copper, *Analytical techniques, Measurement.
Identifiers: *Ion-selective electrodes, *Copper ions.

The behavior of a copper ion-selective electrode is investigated in the range 1.0 to 0.001 micromoles of copper ion. After cleaning by immersion in dilute sulfuric acid, the potential response changes toward its equilibrium potential upon immersion in dilute cupric copper solution. The rate of change of potential is dependent upon the copper ion concentration. EDTA interferes, but 10 micromoles concentrations of hydrogen, calcium, zinc, aluminum, and ferric iron ions interfere only slightly at the 0.1 micromole level of copper ion. Possible analytical use for quantitation purposes is described.
W75-03298

A TURBULENT TUBULAR ELECTRODE,
Wisconsin Univ., Madison. Dept. of Chemistry.
For primary bibliographic entry see Field 2K.
W75-03300

5B. Sources Of Pollution

EUTROPHICATION PROBLEMS IN THE ST. LAWRENCE GREAT LAKES,
Wisconsin Univ., Milwaukee. Center for Great Lakes Studies.
For primary bibliographic entry see Field 5C.
W75-02754

WASTE WATER EFFECTS ON A LARGE BODY OF WATER,
Vsesoyusnyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
Yu. A. Ibad-zade, S. G. Gurbanov, and V. G. Aleskerov.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 76-86. 9 fig, 2 tab, 1 ref.

Descriptors: *Water quality, *Mixing, *Dispersion, *Dimensional analysis, *Waste dilution, Density stratification, Jets, Water pollution, Waste disposal, Planning, Waste water(Pollution), Diffusion.
Identifiers: *Caspian Sea(Baku Bay), *USSR.

The results of experimental and field observations of waste water discharge into the Caspian Sea were given. On the basis of dimensional theory, there were revealed parameters whose variation must influence the hoisting depth of discharged liquids; this was confirmed by the laboratory experiments. The data from the model investigations were compared with the observation results of Baku Bay, where contamination value (BOD5), is linked with direction and force of wind. This is a predominant factor in the process of mixing of the lighter waste liquid and sea water. (See also W75-02751) (Harmeson-ISWS)
W75-02757

THE EFFECT OF SELF PURIFICATION OF FLOWING WATER,
Seoul National Univ. (Republic of Korea). Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-02782

SURFACE WATER POLLUTION BY DISCHARGE OF COMBINED SEWER SYSTEMS, SWISS METHOD OF CALCULATION, (IN FRENCH),
Infraconsult S.A., Bern (Switzerland).
J. Bex.
In: Water for the Human Environment, Volume III, Technical Sessions: Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 378-387. 2 fig, 1 tab, 12 ref.

Descriptors: *Storm water, *Storm runoff, *Combined sewers, *Sewage effluents, *Overflow, Methodology, Rainfall intensity, Discharge(Water), Water quality, Organic loading, Waste assimilative capacity, Urban runoff.
Identifiers: *Switzerland.

As the volume of storm-water can be up to 100 times larger than the normal urban sewage flow, it has to be partly discharged without purification. The method of calculating overflows using the concept of critical rain intensity is being widely applied in Switzerland. As the local conditions vary greatly, one cannot take the same value of critical rain intensity for different receiving waters (brook, stream or sea). To take account of the local conditions and especially of the allowable load of the receiving water, a new method is shown for calculating critical rain intensity. The characteristics of the discharged water as well as the receiving water are analyzed. The analysis takes account of the quantity as well as the quality of the water as a time dependent variable and gives the rate of allowable load for the receiving waters. This allowable load is the basis for the optimal choice of the critical rainfall intensity for which the overflow will be active. (See also W75-02751)
W75-02785

CONCEPTS OF WATERSHED MANAGEMENT: THE SODIUM BUDGETS OF LAKE CHAMPLAIN,
Vermont Univ., Burlington. Lake Champlain Studies Center.
E. B. Henson, and M. Potash.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 428-441. 2 fig, 3 tab, 8 ref.

Descriptors: *Watershed management, *Mathematical models, *Water chemistry, Water circulation, *Sodium compounds, Lake morphometry, Lakes, Management, Planning, *Vermont, *New York, Canada.
Identifiers: *Lake Champlain.

The complex morphometry of Lake Champlain precludes the use of a simple approach to potential watershed management; therefore, a model was developed for evaluating materials budgets in the lake. Results of this study suggest that approximately 59,000 metric tons of sodium enter Lake Champlain annually, about two-thirds from Vermont and Canada on the east, one-fourth from New York on the west, and the remainder from the southern end of the drainage basin. Of the total input, about 22,000 tons apparently remain in the lake. A geographic evaluation of the sodium budget shows that input exceeds removal in all hydrographic regions, however, about one-fourth of all sodium enters in the populated region of Burlington, Vermont, where concentration of initial management efforts to reduce sodium loadings was recommended. (See also W75-02751) (Harmeson-ISWS)
W75-02788

DYE STUDIES THROUGH USE OF ADVANCEMENTS IN AN AERIAL OPTICAL MECHANICAL IMAGING SYSTEM,
Battelle Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 7B.
W75-02792

OIL SPILL DRIFT CAUSED BY THE COUPLED EFFECTS OF WIND AND WAVES,
Missouri Univ., Rolla. Div. of Engineering Research.
R. L. Reisbig.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-777 702, $4.25 in paper copy, $2.25 in microfiche. Final report, October 1973. 61 p, 19 fig, 35 ref, 3 append. DOT-CG-24, 603-A.

Descriptors: *Oil spills, *Laboratory tests, Winds, Movement, *Waves(Water), *Wind velocity, Profiles, Velocity, Surfaces, Air-water interfaces, Currents(Water), Oceans, *Path of pollutants.
Identifiers: *Oil spill drift.

Results of laboratory experiments presented positive evidence that wind induced and wave induced drift mechanisms interact in a complicated way. It was clear that the wave drift and the wind drift are not additive over all regimes of wind speed. At low wind speeds, the wave drift provides an augmentation to the wind drift. At higher wind speeds, the waves caused a net decrease in the coupled drift velocity. Waves traveling in the opposite direction to the wind can have a large effect on the drift velocity, especially at low wind speeds. This situation occurs less than 3% of the time. The wind-wave vectors are from 160 to 180 degrees apart less than 10% of the time. At high wind speeds, opposed waves have little if any effect on the drift speed. The effect of wind and waves traveling at fixed angles to each other is small and the occurrence is infrequent. It was concluded that this effect can be neglected in a drift simulation without introducing serious error. Wind and waves traveling in the same direction occurs most frequently and the effect of waves on drift velocity was significant. It was recommended that the coupled parallel and codirectional effects of wind and waves be included in a drift simulation. Failure to include this effect could lead to serious predictive errors in the path of an oil spill. Also, attempts to generate a mathematical model should include the effect of finite float size where the shear stress causing movement is integrated over its surface. (Humphreys-ISWS)
W75-02794

A MULTILAYER HYDRODYNAMICAL-NUMERICAL MODEL (W. HANSEN TYPE): MODEL DESCRIPTION AND OPERATING/RUNNING INSTRUCTIONS. PART II,
Environmental Prediction Research Facility (Navy), Monterey, Calif.
For primary bibliographic entry see Field 2L.
W75-02798

COMPUTATION OF TIDES, CURRENTS AND DISPERSAL OF POLLUTANTS IN LOWER BAY AND APPROACHES TO NEW YORK WITH FINE AND MEDIUM GRID SIZE HYDRODYNAMICAL-NUMERICAL MODELS. PART 3,
Environmental Prediction Research Facility (Navy), Monterey, Calif.
For primary bibliographic entry see Field 2L.
W75-02799

REMOTE SENSING REPORT, GALVESTON BAY, HOUSTON SHIP CHANNEL, TRINITY BAY, HOUSTON, TEXAS FOR FEBRUARY 1972.
National Field Investigations Center - Denver, Colo.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-230 339, $4.25 in paper copy, $2.25 in microfiche. April 1972. 51 p, 10 fig.

Descriptors: *Water pollution sources, *Surveys, *Remote sensing, *Texas, On-site investigations, Evaluation, Gulf coastal plain, Industrial wastes, Thermal pollution, Oil pollution, *Path of pollutants.
Identifiers: *Houston Ship Channel(Tex), *Galveston Bay(Tex), Trinity Bay(Tex).

An aerial remote sensing program was conducted approximately twice each month from February 1972 to January 1973. Areas covered included: Houston Ship Channel from the Turning Basin at Buffalo Bay to Morgan Point, Galveston Bay from Morgan Point along the Houston Ship Channel to the Gulf of Mexico, and Trinity Bay in vicinity of the Houston Lightning and Power Company cooling water canal discharge. The purpose of aerial reconnaissance was to provide: (1) industrial outfall trend data, (2) data regarding presence and sources of oil pollution in the Houston Ship Channel, and (3) data regarding presence of thermal pollution in Trinity Bay. All industrial discharges present at flight time were recorded and identified to the extent possible. The presence of oil on the Channel waters was significantly less than that recorded during 3 July 1971 flights. Many industrial outfalls have been present during the total of 4 missions. As always, the discharges from 7 industrial complexes were present. The septic tendencies of the Channel waters had improved negligibly from July 1971 flights. The turbidity levels in the upper reaches of Galveston Bay were quite high at the time of the February 1972 flight. This was felt to have been partially caused by the southeasterly winds present at that time. The behavior of the Houston Lighting and Power Company's thermal discharge was effectively documented, and relative temperature levels and plume dispersion patterns were shown. (Humphreys-ISWS)
W75-02801

THE HYDROGRAPHY OF ELKHORN SLOUGH, A SHALLOW CALIFORNIA COASTAL EMBAYMENT,
California State Univ., San Jose. Dept. of Natural Science.
For primary bibliographic entry see Field 5A.
W75-02805

CHEMICAL ADDITIVES TO CONTROL OIL SPILLS--A STATE OF THE ART SUMMARY,
Rensselaer Polytechnic Inst., Troy, N.Y.
W. H. Bauer, and J. J. Bulloff.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-779 557, $5.75 in paper copy, $2.25 in microfiche. Technical Report CG-D-69-74, January 1974. 152 p, 1 append. DOT-CG-33, 755-A.

Descriptors: *Reviews, *Oil spills, *Bibliographies, Documentation, Oil-water interfaces, Stability, Drops(Fluids), Coalescence, Additives, Chemicals, Water pollution control, Pollution abatement, Oil pollution, Water pollution sources.
Identifiers: *Oil slick gellation, Oil-water interfacial drag reduction, Oil slick control, Oil slick behavior, Oil spill containment, Oil spill removal.

The state of the art of using chemical additives to improve the control of oil spills at increased current velocities up to 10 knots was summarized. The current and prospective states of the art were presented in the following areas of oil-water two-phase flow: (1) reduction of oil-water interfacial drag, (2) oil slick gellation, (3) increase of oil-water interfacial stability, and (4) promotion of oil droplet slick coalescence. An extensive bibliography of over 1,000 citations was included in the appendix containing references of most work conducted to date on the subjects of oil slick behavior, oil spill containment and removal, and modifications by additives of oil properties. (Humphreys-ISWS)
W75-02808

WATER QUALITY AND STREAMFLOW CHARACTEISTICS, RARITAN RIVER BASIN, NEW JERSEY,
Geological Survey, Trenton, N.J.
P. W. Anderson, and S. D. Faust.
Water-Resources Investigations 14-74, June 1974. 82 p, 11 fig, 43 ref.

Descriptors: *Water quality, *New Jersey, *Water chemistry, *Path of pollutants, Water pollution, Dissolved oxygen, Oxygen demand, River basins, Sediments.
Identifiers: *Raritan River basin(NJ).

The stream-quality and streamflow characteristics of the Raritan River basin, New Jersey, are described. The investigation covers mainly the period 1955-72. Precipitation in the basin is 47 inches per year. A general trend toward lower flows was observed during the study period; this is attributed to generally lower than normal precipitation. The dissolved-solids concentration of streams in areas little influenced by man's activities generally range from 40 to 200 mg/liter. Those in areas influenced by man often range much higher sometimes exceeding 800 mg/liter. Suspended-sediment yields in the basin range from 25 to 500 tons per square mile annually. The water quality of the Raritan River and most tributaries above Manville generally is good for most industrial, domestic, and recreational uses. There has been a significant increase in sulfate, chloride, and nitrate ions transported per unit of streamflow since 1920. These increases reflect increased waste-water discharges and nutrients in agricultural runoff in the upper basin. Detrimental activities of man are reflected in higher concentrations of most constituents below Manville. A general deterioration in water quality with time in the river below Manville is demonstrated through comparisons of dissolved-oxygen and biochemical-oxygen demand data collected between the late 1920's and early 1970's. Several time-of-travel measurements within the basin are reported. (Knapp-USGS)
W75-02812

AVAILABILITY OF ZINC IN LEAVENED AND UNLEAVENED WHOLEMEAL WHEATEN BREADS AS MEASURED BY SOLUBILITY AND UPTAKE BY RAT INTESTINE IN VITRO,
Nemazee Hospital, Shiraz (Iran). Inst. of Nuclear Medicine.
J. G. Reinhold, A. Parsa, N. Karimian, J. W. Hammick, and F. Ismail-Beigi.
Journal of Nutrition, Vol 104, No 8, p 976-982, August, 1974. 2 tab, 2 fig, 17 ref.

Descriptors: *Zinc, *Foods, *Rodents, *Solubility, Laboratory tests, Diets, Tracers, Radioisotopes, Animal physiology, Laboratory animals.
Identifiers: Iran, Breads, Phytate.

The availability of zinc in leavened and unleavened wholemeal wheaten breads was examined. Wheat, labeled with Zn-65 by injection of label into stems shortly before maturation, was converted into wholemeals of high extraction rate. These were used to prepare yeast-leavened and also unleavened flat breads, the latter being similar to those consumed as the principal dietary staple in rural Iran and nearby countries. The solubility of Zn-65 and of stable Zn was two-to threefold greater when leavened bread was suspended in 0.85% NaCl solutions adjusted to pH values between 4.5 and 7.5 than when unleavened bread was so suspended. Uptake of Zn-65 by strips of rat jejunum and ileum from suspensions of leavened bread also was significantly greater. The solubility of Zn-65 in suspensions of wholemeal bread, either leavened or unleavened, increased exponentially as pH decreased from 7.0 to 4.5. It was concluded that fermentation with yeast markedly increases the physiological availability of zinc in wholemeal bread. The gains were attributed in part to the action of yeast in destroying phytate. (Jernigan-Vanderbilt)
W75-02830

THE AUTOMATIC SPECTROPHOTOMETRIC DETERMINATION OF MANGANESE (II) AFTER CATION-EXCHANGE CHROMATOGRAPHY,
Government Industrial Research Inst., Nagoya (Japan).
For primary bibliographic entry see Field 5A.
W75-02834

ANTIBIOTIC RESISTANCE AND R FACTORS IN COLIFORM BACILLI ISOLATED FROM HOSPITAL AND DOMESTIC SEWAGE,
Bristol Univ. (England). Dept. of Bacteriology.
For primary bibliographic entry see Field 5A.
W75-02854

BACTERIAL DEGRADATION OF POLYCHLORINATED BIPHENYLS. I. IDENTIFICATION OF SOME METABOLIC PRODUCTS FROM AROCLOR 1242,
Canada Centre for Inland Waters, Burlington (Ontario).
K. L. Kaiser, and T. S. Wong.
Bulletin of Environmental Contamination and Toxicology, Vol 11, No 3, p 291-296, March, 1974. 2 fig, 1 tab, 11 ref.

Descriptors: *Biodegradation, *Polychlorinated biphenyls, Aquatic life, Investigations, Separation techniques, Aquatic microorganisms, Rivers, *Pollutant identification, Gas chromatography, Mass spectrometry.
Identifiers: *Metabolites, *Aroclor 1242.

The biodegradation of polychlorinated biphenyls (PCB's) was investigated and their kinetic and mechanistic differences were determined with respect to different aquatic organisms. A bacterial culture, isolated from lake water was shown to degrade PCB's at a relative high concentration of a commercial mixture, Aroclor 1242. Several of the metabolites were identified by their mass spectral and gas chromatographic data. None of the metabolites seem to contain any chlorine. (Merritt-FIRL)
W75-02859

SIMPLE METHOD FOR INTRODUCING ELEMENTAL MERCURY INTO BIOLOGICAL GROWTH SYSTEMS,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
H. W. Holm, and M. F. Cox.
Applied Microbiology, Vol 27, No 3, p 622-623, March, 1974. 1 fig, 1 tab, 8 ref.

Descriptors: *Mercury, *Aquatic environment, Sediment-water interfaces, Oxidation, Equipment, Natural streams, *Growth rates, Water pollution sources, Water pollution effects.
Identifiers: *Biological growth systems(Closed).

The applications of a simple method for introducing elemental mercury into closed biological growth systems are described. A 1 liter Erlenmeyer flask equipped with a 24/40 standard taper outer joint was modified to permit a closed system. The system may be used to investigate such processes as the transformations of mercury using pure cultures of bacteria, the behavior of mercury in sediment water systems, and the oxidation of mercury in natural waters. The apparatus may be used in similar applications involving other volatile materials. (Merritt-FIRL)
W75-02862

EFFECT OF AIRCRAFT DEICER ON AIRPORT STORM RUNOFF,
Department of Transport, Ottawa (Ontario).
M. Schultz, and L. J. Comerton.
Journal of the Water Pollution Control Federation, Vol 46, No 1, p 173-180, January, 1974. 3 fig, 1 tab, 3 ref.

Descriptors: *Canada, *Deicers, Biochemical oxygen demand, *Storm drains, *Storm runoff.
Identifiers: *Montreal(Canada), *Aircraft deicers, Ethylene glycol, Propylene glycol.

The effect of aircraft deicer on airport storm runoff was investigated, and the airport storm characteristics at Dorval, Montreal's International Airport, were determined from February 1 to April 15, 1972. The aircraft deicers which are approximately 50 percent water, 50 percent ethylene and/or propylene glycol, and have a high biochemical oxygen demand (BOD) are the major pollutants in apron storm runoff during the winters. The anticipated apron runoff for an airport, where the storm sewer system is designed to accept relatively little snow melt and no surrounding water, can be calculated by adding rainfall data and all daily snow falls less than one inch. At Dorval the precipitation was 4.60 inches. If storm sewers do not drain the water table or adjacent snow melt areas, separate evaluations are necessary. The organic loading ratio of storm to sanitary waste was 4:1 during the winter. The BOD to glycol relationship for all BOD values greater than 200 microgram/liter is equal to -50 + 0.85 glycol. (Merritt-FIRL)
W75-02872

MODELING AND OPTIMIZATION OF TRANSIENT COOLING WATER DISCHARGE FROM POWER GENERATING PLANTS: PHASE II - APPLICATIONS TO REGIONAL SITUATIONS,
Kansas State Univ., Manhattan. Dept. of Industrial Engineering; and Kansas State Univ., Manhattan. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5G.
W75-02884

HYDROCHEMICAL INVESTIGATIONS OF THE CENTRAL KENTUCKY KARST AQUIFER SYSTEM,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 3B.
W75-02891

DEVELOPMENT OF METHODS FOR CONTROLLING THE CADMIUM AND ZINC CONTENT OF WATER,
Rhode Island Univ., Kingston. Dept. of Chemical Engineering.
K. H. Mairs.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-238 299, $3.25 in paper copy, $2.25 in microfiche. Completion Report, 1974. 5 p. OWRT A-047-RI(1). 14-31-0001-3840.

Descriptors: *Zinc, *Cadmium, *Corrosion control, Potable water, Metal pipes.
Identifiers: Soft water, Aggressive water, Mineralization.

A study has been made to determine whether cadmium as an impurity in zinc used in the manufacture of brass or galvanized water pipe can contribute a hazardous contamination to mildly aggressive water. Only minor quantities of cadmium have been found in such products and no tendency has been observed for the selective corrosion of cadmium. Observations suggest that cadmium hazard from such a source is very unlikely.
W75-02892

THE RELATIONSHIP OF ELECTRIC POWER STATION THERMAL CIRCULATION OF BIOLOGICAL PRODUCTIVITY OF RESERVOIR,
Baylor Univ., Waco, Tex. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W75-02893

THE ROLE OF SEA GRASSES AND BENTHIC ALGAE IN THE GEOCHEMISTRY OF TRACE METALS IN TEXAS ESTUARIES,
Texas Univ., Austin. Dept. of Botany.
B. N. Smith.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-238 300, $3.25 in paper copy, $2.25 in microfiche. Completion Report, October 1974. 6 p, 1 fig, 1 tab, 3 ref. OWRT B-175-TEX(1). 14-31-0001-4129.

Descriptors: *Texas, *Metals, *Trace elements, Algae, *Estuaries, Model studies, Path of pollutants, Benthic flora, Geochemistry, Zinc, Nickel, Copper, Cobalt, Cadmium, *Chlorophyta, Manganese.
Identifiers: *Sea grasses, Ulva spp, Enteromorpha spp.

A model was proposed and evaluated for trace metal accumulation in marine plants growing under changing environmental conditions. Monthly collections were made at 22 stations in estuaries near Corpus Christi. The results revealed significant fluctuations in the concentration of Cd, Co, Cu, Mn, Ni, and Zn in sea water and in the accumulation of these trace metals in benthic plants. A mathematical relationship was determined between the accumulation of metals in benthic plants and the concentration of metals in sea water, a relationship remaining consistent for several metals and all plants tested. Finally, an interpretation of the above relationship revealed a better understanding of the significance of the Irving-Williams order of complex stability to the biogeochemistry of metals.
W75-02894

COMBINED CONDUCTION-RADIATION ENERGY TRANSFER IN STAGNANT WATER,
Purdue Univ., Lafayette, Ind. Heart Transfer Lab.
D. M. Snider, and R. Viskanta.
Water Resources Research, Vol 10, No 5, p 939-946, October 1974. 9 fig, 14 ref. OWRR-A-029-IND(8).

Descriptors: *Conduction, *Radiation, *Stagnant water, Convection, *Energy transfer, *Heat transfer, Temperature, Thermal stratification, Solar radiation, Diurnal, Heating, Absorption, Hydraulic models, Laboratory tests, Air-water interfaces, Water temperature, Evaporation.
Identifiers: Insolation.

The transient heating by radiation of a stagnant layer of water was studied both analytically and experimentally. Solar radiation was simulated by tungsten filament lamps in parabolic reflectors of known spectral characteristics. The volumetric rate of internal absorption of radiation was predicted by considering spectral absorption, scattering, and multiple forward scattering by the water according to a model. The transient temperature distribution was predicted by solving the one-dimensional energy equation analytically in closed form after first linearizing the boundary condition at the air-water interface. The analytical model was verified on the basis of laboratory experimental data obtained from transient temperature measurements made in pure water contained in a glass wall test cell using an interferometer. Comparison of experimental data with the predicted temperature distributions showed good agreement, thus verifying the radiation and total energy models. It was determined that the surface boundary condition and internal radiant heating rate of water must be correctly specified in order to model thermal stratification of stagnant water by radiation properly. (Roberts-ISWS)
W75-02902

EFFECT OF TWO NONIONIC SURFACTANTS ON ADSORPTION AND MOBILITY OF SELECTED PESTICIDES IN A SOIL-SYSTEM,
California Univ., Riverside. Dept. of Soil Sciences and Agricultural Engineering.
F. Huggenberger, J. Letey, and W. J. Farmer.
Soil Science Society of America Proceedings, Vol 37, No 2, p 215-219, March-April 1973. 4 fig, 14 ref. (California Water Resources Center Project UCAL-WRC-W-332). OWRT B-141-CAL(6).

Descriptors: *Mass transport, Leaching, Surfactants, *Adsorption, Pesticides, *Pesticide residues, *Soil analysis, Path of pollutants, Water pollution sources.
Identifiers: Critical micelle concentration, Lindane, Diuron, Atrazine.

The effect of two nonionic surfactants on the adsorption and mobility of lindane, diuron, and atrazine in soil columns was studied. A wide range of surfactant concentrations was used. Adsorption of the pesticides by soil from a surfactant solution was inversely related to the leaching of the pesticides through the soil in presence of the surfactants. Low concentrations of both surfactants did not influence adsorption and mobility of the pesticides. A marked increase in the adsorption and reduction in the mobility of the pesticides was observed with 500 ppm Aqua Gro and 2,000 ppm Soil Penetrant. At concentrations of 5,000 ppm and 10,000 ppm, both surfactants decreased the adsorption and increased the mobility of lindane and diuron, but did not influence the adsorption and mobility of atrazine. An attempt was made to explain the mechanisms by which the two surfactants influence adsorption and mobility of the pesticides using the concept of micelle formation and critical micelle concentration. (Synder-California, Davis)
W75-02912

CHEMICAL COMPOSITION OF EFFLUENT FROM HIGH DENSITY CULTURE OF CHANNEL CATFISH,
Georgia Univ., Savannah. Agricultural Experiment Station.
J. W. Page, and J. W. Andrews.
Water, Air, and Soil Pollution, Vol 3, No 3, p 365-369, September 1974. 1 fig, 2 tab, 14 ref.

Descriptors: *Channel catfish, *Fish farming, *Organic wastes, *Animal metabolism, Fish management, Biochemical oxygen demand, Water quality control, Water pollution sources, Analytical techniques, Nitrogen compounds, Waste water(Pollution), Metabolism.
Identifiers: *Metabolic waste products.

Production rates of metabolic wastes by channel catfish (Ictalurus punctatus) were estimated by analyzing effluents from high density culture of 940 g and 60 g catfish. Results were integrated over a 24 h steady-state period in which normal feeding activities were maintained and were expressed as g/day/kg fish and g/day/kg feed consumed. When expressed on a unit fish weight basis, production rates were greater for 60 g than for 940 catfish. However, when expressed on a feed consumption basis, production rates of most catabolic products were approximately equal for both size fish. Average values (g/day/kg feed) were as follows: total N, 67; ammonia N, 20; nitrate-nitrite N 20; 5-day BOD, 98; total solids, 180; total P, 15; total K, 18. Filtered solids from effluent contained 5% nitrogen, 1.6% phosphorus and .13% potassium. Diurnal variation in production rates were noted with solid production reaching a maximum after each feeding and BOD, NH3, and nitrate reaching a maximum only in the afternoon. (Katz)
W75-02920

THE INFLUENCE OF 'RED SLUDGE' ON GREEN ALGAE POPULATIONS (UBER DEN EINFLUSS VON ROTSCHLAMM AUF DIE BESIEDLUNGSOICHTE VON GRUNALGEN),
Bundesforschungsanstalt fuer Fischerei, Hamburg (West Germany). Institut fuer Kuesten- und Binnenfischerei.
For primary bibliographic entry see Field 5C.
W75-02921

DISTRIBUTION OF SOME HEAVY METALS IN ORGANISMS IN HARDANGERFJORD AND SKJERSTADFJORD, NORWAY,
Bristol Univ. (England). Dept. of Inorganic Chemistry.
R. D. Stenner, and G. Nickless.
Water, Air, and Soil Pollution, Vol 3, No 3, p 279-291, September 1974. 3 fig, 10 tab, 13 ref.

Descriptors: *Industrial wastes, *Water pollution sources, Mercury, Lead, Cadmium, Zinc, *Heavy metals, Copper, Fish, Algae, Mollusks, Mussels, Sampling, *Path of pollutants, Fjords.
Identifiers: *Norway, Tissue analysis.

Metal bearing waters enter the Sorfjord, a tributary of the Hardangerfjord in West Norway. Unusually high concentrations of Cd, Pb, and Zn are present in marine life over a considerable length of the fjord. In North Norway, marine organisms contain high concentrations of Cu, but this contamination is confined to a small area of the Skjerstadfjord system. Specimens of a wide range of the flora and fauna of these areas were analyzed for heavy metal concentrations. (Katz)
W75-02923

VERTICAL DISTRIBUTION OF THE BACTERIOPLANKTON AND THE THERMAL-OXYGEN RELATIONS IN THE WATER OF THE ILAWA LAKES,
Akademia Rolniczo-Techniczno, Olsztyn-Kortow (Poland). Instytut Inzynierii i Biotechnologii Zywnosci.
For primary bibliographic entry see Field 5C.
W75-02926

SOURCE-BASED EFFLUENT LIMITATIONS,
For primary bibliographic entry see Field 5G.
W75-02958

THE RELATION OF IRRIGATION RETURN-FLOWS TO WATER CHEMISTRY AND PERIPHYTON IN THE LEMHI RIVER, IDAHO,
Idaho Univ., Moscow. Coll. of Forestry, Wildlife and Range Sciences.
T. Halbach, and C. M. Falter.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 346, $3.75 in paper copy, $2.25 in microfiche. Idaho Water Resources Research Institute, Moscow, Completion Report, August, 1974. 39 p, 7 fig, 6 tab, 23 ref. OWRT A-041-IDA(1). 14-31-0001-3812.

Descriptors: *Irrigation, *Return flow, *Periphyton, *Algae, Bioassays, *Idaho, *Water chemistry, Productivity, Water quality, Nitrates, Phosphates, Dissolved solids, Diatoms, Cladophora, Cytological studies, *Path of pollutants.
Identifiers: *Lemhi River(Idaho).

Irrigation development in the Lemhi Valley is related to both the chemical quality of the river water and the instream algal populations. Nitrate concentrations in the river peaked shortly after onset of irrigation in the spring, then decreased through the summer. Nitrates also decreased downriver due to high algal demand and possible dentrification within the soil. Phosphate concentrations increased more slowly than did nitrates after onset of irrigation but increased consistently downriver. Total dissolved solids increased downriver, and ranged from 140 mg/l in May to 385 mg/l in August. Algal communities in the river were composed almost entirely of epilithic diatoms (Class Bacillariophyceae), except in the extreme lower river during July and August. A bloom of the green alga, Cladophora sp., completely dominated the flora of the lower river at that time. Periphyton cell density after 28 days colonization on bare slides ranged from 256 to 16,106 cells per mm sq. Density on natural substrate was similar to or slightly greater than on glass slides after periods of 28-42 days in the river. Turbidity, temperature and altitude accounted for more of the variability in cell numbers than did nutrient concentrations.
W75-02980

HYDROGEOCHEMICAL INVESTIGATION OF SELECTED WATERSHEDS IN SOUTHWESTERN MONTANA,
Montana Bureau of Mines and Geology, Butte.
M. R. Miller.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 348, $3.75 in paper copy, $2.25 in microfiche. Montana Univ. Joint Water Resources Research Center, Bozeman, Report No 60, December 1974. 25 p. OWRT A-029 MONT(1). 14-01-0001-1846, 14-01-0001-3226.

Descriptors: *Watersheds(Basins), *Demonstration watersheds, *Montana, *Geologic investigations, *Hydrogeology, Water quality, Geochemistry, *Water chemistry, Seasonal, *Small watersheds, Metals, Trace elements.

A two-year study was conducted (1969-1971) to delineate the geological factors that influence the water quality of selected watersheds in southwestern Montana. Secondary objectives included investigation of parameters or group of constituents to see which are the best indicators of geologic environment and examination of the effects of seasonal variations on water chemistry. Seven small watersheds were studied, each containing one predominant rock group. The watersheds range in size from 2 to 9 square miles, and most are along the flanks and foothills of several mountain ranges. An attempt was made to select watersheds where man's activities are minimal. Findings indicate that bedrock geology does influence the water chemistry of watersheds; waters issuing from watersheds in metamorphic and in plutonic terrains seem to be similar in composition and concentration; carbonate, sandstone, shale and volcanic terrains seem to influence the water chemistry the most; concentrations of major constituents vary inversely with stream discharge; concentrations of trace metals seem to remain almost constant regardless of discharge; in general trace-metals concentrations were too low to be significant, suggesting that stream sediments may be more useful than stream water as a geochemical exploration tool. (Williams-Montana State)
W75-02983

NUTRIENTS AND SUSPENDED SEDIMENTS FOR FORESTED WATERSHEDS IN THE EAST-CENTRAL SIERRA NEVADA,
Nevada Univ., Reno. Desert Research Inst.
C. M. Skau, and J. C. Brown.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 363, $3.25 in paper copy, $2.25 in microfiche. Completion Report, December 1974. 17 p, 4 tab, 8 ref. OWRT A-051-NEV(1). 14-31-0001-4028.

Descriptors: *Water quality, *Nevada, *Forest watersheds, Land use, Drainage, Watersheds(Basins), *Regression analysis, Sediments, Phosphorus, Nitrogen, Equations, *Nutrients, Dissolved solids, *Suspended solids, Drainage, *Path of pollutants.
Identifiers: *Sierra Nevada Mountains.

Evaluation of water quality is necessary to determine what regulations must be imposed on land-use practices and other activities to maintain high water quality. Dissolved nutrients and suspended sediments were studied as indicators of water quality. Watersheds of the eastern Sierra Nevada Mountains were selected as study sites to evaluate constituents in determining: (1) the natural watershed characteristics influence on the nutrient and suspended sediment of the drainage system; (2) affects of land use; and (3) development of a practical method for predicting nitrogen, phosphorus, and suspended sediment yield. A multiple regression technique was used to develop regression equations using six variables which adequately represent the yields of nitrogen, phosphorus, and suspended sediments. Suspended sediments are confined to periods of high water flow unless there are land disturbances which periodically add to the sediment content. Factors affecting dissolved nutrient content are related to the seasonal temperatures with increased flow showing more dissolved nutrients present in the watershed drainage. The application of the regression equations to local watersheds will enable area planners to make reliable evaluations for preserving water quality in their respective areas. (Fallon-Nevada)
W75-02984

RIVERINE RECREATIONAL DEVELOPMENT-MATHEMATICAL MODELING,
Carnegie-Mellon Univ., Pittsburgh. Dept. of Civil Engineering.
R. M. Shane, H. J. Day, S. M. Frenkil, P. H. P. Ho, and F. C. McMichael.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 350, $5.25 in paper copy, $2.25 in microfiche. Publication No R74-6, Oct 1974. 109 p, 19 fig, 22 tab, 36 ref. OWRT C-2183(3381)(2). 14-31-0001-3381.

Descriptors: *Social participation, *Alternative planning, Sites, *Recreation, Planning, *Water quality, Water chemistry, *Mine drainage, Cities, Hydrology, *Pennsylvania, *Mathematical models, *Urbanization, *Hydrogen ion concentration, Carbon dioxide, Computer programs, Recreation demand, Swimming, Boating, Fishing.
Identifiers: Allegheny River(Penn), Pittsburgh(Penn).

Procedures were developed to compare alternative urban riverine recreational sites with regard to potential water quality problems and the level of participation to be expected from various segments of the urban population. The methods developed were applied to the urban portion of the Allegheny River located in Western Pennsylvania. Through the use of basic principles of water chemistry, a pH model was developed in the form of two expressions. The first permits a determination of pH when the concentrations of alkalinity and CO_2--acidity are known, while the second simulates the change in the hydrogen ion concentration resulting from the gain or loss of carbon dioxide at the air-water interface. Satisfactory results were obtained when sufficient data were available. Digital computer routines were formulated so that numerical procedures necessary for the application of the model can be easily added to existing water quality models. Participation estimation procedures for swimming, boating and fishing were developed using recreational survey data from Pittsburgh, Pa. Socio-economic and demographic variables considered in the analyses included household income, automobile availability, household size, race, age of household head, education level of household head, and accessibility.
W75-02985

STREAM DRIFT AS AN INDICATION OF WATER QUALITY,
Illinois State Natural History Survey, Urbana.
R. W. Larimore.

Transactions of the American Fisheries Society, Vol 103, No 3, p 507-517, July 1974. 8 tab, 4 fig, 11 ref. OWRT B-001-ILL(2).

Descriptors: *Benthos, Streams, *Water pollution sources, Water pollution effects, *Industrial wastes, *Domestic wastes, *Aquatic drift, Water quality, Bioindicators, Tubificids, Benthic fauna, Nitrates, Methodology, Nematodes, Mayflies, Diptera, Invertebrates, Sampling, Assay, Bottom sampling, Nets.
Identifiers: *Stream drift, Drift organisms.

Stream drift and benthos were collected from five stream locations having different levels of domestic and industrial pollution. The drift organisms from 100 cu m of water during the diel period of peak drifting were compared with the benthos from 1 sq m of stream bottom. Numbers and weights of both drift and benthos followed similar quantitative relations with water quality, generally increasing with water degradation. The relative abundance of benthos greatly exceeded that of the drift at the most polluted station where tubificids, which infrequently drift, were abundant. A greater variety of organisms occurred in the drift than in the benthos. Drifting organisms came from a wider spectrum of habitats and were collected with less effort than benthic organisms but did not always include certain benthic forms that seldom leave the stream bottom. (Katz)
W75-02989

PRODUCTION AND RELEASE OF TRITIUM BY NUCLEAR POWER PLANTS AND REPROCESSING PLANTS AND THE EXPECTED RADIOLOGICAL BURDEN TILL THE YEAR 2000, (IN GERMAN),
Kernforschungszentrum, Karlsruhe (West Germany). Institut fuer Neutronenphysik und Reaktortechnik.
G. Grathwohl.
Available from NTIS, Springfield, Va 22161, as Rept No NP-19896, $5.45 in paper copy, $2.25 in microfiche. Report No NP-19896, February 1972. 88 p, 15 fig, 23 tab, 71 ref.

Descriptors: *Tritium, *Productivity, *Nuclear powerplants, *Fuels, *Effluents, *Forecasting, Projections, Estimating, Rates, Census, Safety, Evaluation, Rivers, Absorption.
Identifiers: *Fuel fabrication, *Fuel reprocessing.

The natural tritium production is summarized together with the yields from nuclear weapons and nuclear facilities. Specific production rates and the consequent release rates, representative of time are evaluated for the different types of nuclear power plants. Release rates from fuel reprocessing plants are also included. At estimation of tritium inventory from fusion reactors is also attempted. Based on the forecasted onset on nuclear facilities till the year 2000, the time-dependent production rates as well as the global inventory are calculated. On the strength of the release rates and a global mixture in the hydrosphere, tritium concentration in water is evaluated. For the German river system the tritium-uptake capacity is estimated. (Houser-ORNL)
W75-02991

MICROBIAL DEGRADATION OF PETROLEUM AT LOW TEMPERATURE,
Rhode Island Univ., Kingston. Dept. of Plant Pathology-Entomology.
A. M. Cundell, and R. W. Traxler.
Marine Pollution Bulletin, Vol 4, No 8, p 125-127, August 1973. 22 ref.

Descriptors: *Isolation, *Bottom sediments, *Marine bacteria, *Microbial degradation, Littoral, Growth rates, Soil bacteria, Aquatic soils, Saline water, Sea water, Temperature, Organic compounds, Pollutants, Oil, Biodegradation, Alaska, Canada, Marine microorganisms, Pseudomonas, Oil pollution, Oil spills, Water pollution, Aerobic bacteria.
Identifiers: *Substrate utilization, Fate of pollutants, Hydrocarbon-oxidizing bacteria, Aromatic hydrocarbons, Aliphatic hydrocarbons, Arthrobacter, Corynebacterium, Vibrio, Achromobacter, Brevibacterium, Chedabucto Bay, Cape Simpson, Substrates, Marine environment, Dodecane, Hexylbenzene, Decalin, Tetralin, Naphthalene, Phenanthracene, Methylcyclohexane, Growth media, Culture media.

Hydrocarbon-degrading bacteria were isolated from littoral sediments collected in Chesapeake Bay, Nova Scotia, and from oil-contaminated soil adjacent to a natural oil seep at Cape Simpson, Alaska by an enrichment culture technique using Nos. 1 and 6 fuel oils and naphthalene as enrichment substrates. The enrichment flasks were incubated at 0, 8, 16 and 24 C. The majority of bacteria were isolated from the 16 and 24 C enrichment flasks and were members of the genera Pseudomonas, Arthrobacter, Corynebacterium, Vibrio, Achromobacter, and Brevibacterium. The range of hydrocarbon utilization was studied using a Pseudomonas and an Arthrobacter isolate. Growth on solid media containing the hydrocarbons at 16 C was used as criteria and it was shown that the isolates grew at the expense of dodecane, hexylbenzene, naphthalene, phenanthracene, decalin, tetralin and methylcyclohexane but not xylene. Growth occurred between 8 C and 24 C within 14 days of incubation suggesting the bacteria are tolerant of a range of temperatures. The data suggest that bacteria existing in low temperature marine and coastal environments play a significant role in the biodegradation of pollutant hydrocarbons. (Holoman-Battelle)
W75-02999

AN APPROXIMATE NUMERICAL SOLUTION OF A POLLUTANT DISPERSION,
Kyoto Univ. (Japan). Dept. of Sanitary Engineering.
H. Sumitomo.
Transactions of the JSCE (Japan Society of Civil Engineers), Vol 4, p 120-121, November 1973. 3 fig.

Descriptors: *Pollutants, *Dispersion, *Analytical techniques, Diffusion, Turbulent flow, Water quality, Reynolds' number, Pollution problems, Hydraulics, Path of pollutants.
Identifiers: *Diffusion equation, Reynolds' analogy, Numerical solutions.

Diffusion equations have often been utilized for describing water quality. However, the physical meaning of the diffusion coefficient is not always clear, especially in turbulent flow with internal shear force. The word 'dispersion' is often used for complicated flow, instead of 'diffusion', and dispersion is distinguished from molecular diffusion. Here the possibility of employing simpler presentation for the dispersion is discussed. The purpose of the simplification is to consider more hydraulic characteristics for solving pollution problems in addition to the mass balance of water quality. (Prague-FIRL)
W75-03004

MIREX INCORPORATION IN THE ENVIRONMENT: RESIDUES IN NONTARGET ORGANISMS, 1972,
Alcorn A and M Coll., Lorman, Miss. Dept. of Biology.
For primary bibliographic entry see Field 5A.
W75-03009

FEEDLOT RUNOFF CONTROL SYSTEM DESIGN AND INSTALLATION - A CASE STUDY,
Agricultural Research Service, Lincoln, Nebr.
For primary bibliographic entry see Field 5D.
W75-03013

HOW TO GUARD AGAINST POLLUTION FROM BEEF CATTLE FEEDLOT WASTES,
Agricultural Research Service, Lincoln, Nebr.
For primary bibliographic entry see Field 5D.
W75-03015

INTERACTIONS OF MICROBIAL METABOLISM AND SOIL PHYSICAL PROPERTIES AND THEIR SIGNIFICANCE IN SOME HYDROLOGICAL PROCESSES,
Agricultural Research Service, Baton Rouge, La. Soil and Water Conservation Research Div.
For primary bibliographic entry see Field 2G.
W75-03031

A WATER QUALITY MODEL FOR A CONJUNCTIVE SURFACE-GROUNDWATER SYSTEM,
Florida Univ., Gainesville. Dept. of Environmental Engineering Sciences.
A. I. Perez, W. C. Huber, J. P. Heaney, and E. E. Pyatt.
Copy available from GPO Sup Doc as EP1.23:600/5-74-013, $3.30; microfiche from NTIS, Springfield, Va 22161 as PB-238 491; $2.25. Environmental Protection Agency, Socioeconomic Studies Series Report EPA-600/5-74-013, May 1974. 323 p, 89 fig, 4 tab, 175 ref, 7 append. EPA Project 16110 GEW.

Descriptors: *Surface-groundwater relationships, *Surface runoff, *Base flow, *Unsaturated flow, *Water pollution, Path of pollutants, Agricultural watersheds, *Florida, Nutrients, Nitrates, Phosphates, Hydrologic models, Mathematical models, Model studies, Data collections, Conjunctive use.
Identifiers: *Agricultural pollution, *Lake Apopka(Florida), Water quality models.

Increasing pressures toward efficient decision-making in water pollution control are creating the need for improved pollutant routing models. Such mathematical models help understand cause and effect relationships between sources of pollutants and their ensuing concentrations at various locations in a basin. Considered in this study were both flow and water quality processes occurring on the ground surface, in the unsaturated soil zone and in the saturated or groundwater zone. The objective was to improve already available formulations for the above processes and subsequently to develop a methodology for interfacing the individual models. Emphasis was placed on the modeling of agricultural pollution. For this reason, nitrogen and phosphorous were the main substances considered. The selection of the Lake Apopka basin in Central Florida as the study area was made in accordance with these project goals. The data base for this basin was limited, but better than that for other candidate areas in Florida. However, this data base appeared typical of that available to engineers in the analysis of a practical problem. The scope of this particular study precluded additional sampling. Current data limitations precluded a complete verification of the model. However, various general conclusions could be drawn. In the future, the formulation could be viewed as an instrument for structuring data gathering efforts. (EPA)
W75-03042

THE INTEGRATED MULTI-MEDIA POLLUTION MODEL,
Georgetown Univ., Washington, D.C. Dept. of Economics.
Inja K. Paik, John Harrington, Jr, and F. W. McElroy.
Copy Available from GPO Sup Doc as EP1.23:600/5-74-020, $3.30. Environmental Protection Agency, Socioeconomic Studies Series, EPA-600/5-74-020, February 1974. 259 p, 12 fig, 54 ref, append. EPA Program Element 1BA096. 801411.

Descriptors: Environment, Land use, Management, Dispersion, *Model studies, *Cities, *Regional analysis, *Path of pollutants, *Quality control, Waste disposal, Resources, *Alternative planning.

The primary objective of the project was to develop a prototype multi-pollution model for a typical metropolitan region. This report includes the basic design and some of the results of initial testing of the model. The Integrated Multi-Media Pollution Model, or IMMP, views environmental pollution as a set of interrelated problems--the solution of which requires examination of all types of pollution jointly and simultaneously--and attempts to seek an overall solution to environmental resource management. The model embodies the trade-offs among different forms of residuals disposed finally in the environment that are effected by alternative land use policies, production processes, pollution control strategies and methods. Thus, the Land Use submodel relates various land use policies to the distribution of the sources of environmental pollution; the Residuals submodel relates alternative levels of pollution generating activities, input mixes, production processes of various activities and the alternative treatment processes associated therewith to the magnitude, composition and distribution of pollutants; and Disposal-Dispersion submodel relates pollution emissions at source to (ambient) environmental quality at destination. The model provides a comprehensive framework in which to test and evaluate a wide range of strategies for planning, managing and controlling our environmental resources. (EPA)
W75-03045

EFFECT OF INCORPORATION OF LEAD ON SOLUBILITY OF THE BONE MINERAL,
G. M. Coll., Sambalpur (India). Dept. of Chemistry,
For primary bibliographic entry see Field 5C.
W75-03057

COMPETITIVE BINDING OF MERCURIC CHLORIDE IN DILUTE SOLUTIONS BY WOOL AND POLYETHYLENE OR GLASS CONTAINERS,
Western Regional Research Lab., Berkeley, Calif.
M. S. Masri, and M. Friedman.
Environmental Science and Technology, Vol 7, No 10, p 951-953, October, 1973. 1 fib, 4 tab.

Descriptors: *Mercury, *Plastics, *Adsorption, Contaminants, Toxicity, Laboratory tests, Inorganic compounds, Inorganic compounds, Sampling, *Waste water treatment, Filtration, Industrial wastes.
Identifiers: *Mercuric chloride, *Wool.

Comparison of binding efficiencies of native, reduced, and S-beta-2(2-pyridylethyl) wool for mercuric chloride over a wide concentration range shows that the modified wools are more effective than native wool in the parts-per-million range but that the three wools are nearly equivalent in the parts-per-billion range. The modified wools thus have a greater total capacity for mercury salts at the higher (parts-per-million) mercury levels. Competitive sorption of mercuric chloride by polyethylene and glass surfaces of containers may take place at low mercury salt levels. The results show that mercuric chloride is distributed between the liquid phase, wool, and the container and that wool competes effectively with the container for mercuric chloride. Chloride ions and hydrochloric acid desorb mercuric chloride from the container. (Jernigan-Vanderbilt)
W75-03058

EFFECT OF SELENITE ON THE TOXICITY OF DIETARY METHYL MERCURY AND MERCURIC CHLORIDE IN THE RAT,
North Carolina State Univ., Raleigh. Dept. of Biochemistry.
For primary bibliographic entry see Field 5C.
W75-03062

KINETICS OF TRANSPLACENTAL MOVEMENT OF MERCURY FED IN A TUNA MATRIX TO MICE,
Oregon State Univ., Astoria. Seafoods Lab.
For primary bibliographic entry see Field 5C.
W75-03063

DIGESTION AND DEWATERING OF PHOSPHORUS-ENRICHED SLUDGES,
Northeastern Univ., Boston, Mass.
For primary bibliographic entry see Field 5D.
W75-03070

CADMIUM, ZINC, COPPER AND LEAD IN HUMAN RENAL CORTEX,
Karolinska Institutet, Stockholm (Sweden). Dept. of Environmental Hygiene.
For primary bibliographic entry see Field 5A.
W75-03071

IRON AND MANGANESE STUDIES OF NEBRASKA WATER SUPPLIES,
Nebraska Univ., Lincoln. Dept. of Civil Engineering.
D. R. Anderson, D. D. Row, and G. E. Sindelar.
Journal of the American Water Works Association, Vol 65, No 10, p 635-641, October, 1973. 3 fig, 4 tab, 8 ref. FWQA(ITI-WP-120-01A1).

Descriptors: *Iron, *Manganese, *Water supply, Water pollution, Standards, Oxidation, Copper, Potable water, *Nebraska, Waste water treatment, Cations.
Identifiers: Grand Island(Neb).

Two studies were made on iron and manganese in public water supplies in the state of Nebraska. The first study consisted of evaluating thed effectiveness of existing treatment plants in removing these cations. Based upon the recommended maximum limits for iron and manganese, only seventeen of 28 plants, or 60%, were providing adequate treatment. The second study was concerned with determining the reason for serious staining problems in the Grand Island, Nebraska public water supply even though iron and manganese concentrations were below the recommended limits of Public Health Service drinking water standards. The iron and manganese problems at Grand Island, Nebraska were aggravated by the layout of the system which resembled a simplified iron- and manganese-treatment plant without a filter. The presence of catalysts including copper in the raw water and deposits of oxidized iron and manganese in the system also contributed to the problem. (Jernigan-Vanderbilt)
W75-03078

ACCUMULATION OF MIREX RESIDUES IN SELECTED ORGANISMS AFTER AN AERIAL TREATMENT, MISSISSIPPI, 1971-72,
Mississippi State Univ., State College. Dept. of Zoology.
For primary bibliographic entry see Field 5A.
W75-03079

CADMIUM TOXICITY IN GROWING SWINE,
Rutgers - the State Univ., New Brunswick, N.J. Dept. of Animal Sciences.
For primary bibliographic entry see Field 5C.
W75-03080

SPECTROPHOTOMETRIC DETERMINATION OF PETN IN WASTE WATER FROM LEAD STYPHNATE PRIMER PLANTS,
Frankford Arsenal, Philadelphia, Pa.
For primary bibliographic entry see Field 5A.
W75-03081

BIOAVAILABILITY OF DIFFERENT SOURCES OF DIETARY IRON FED TO PITMAN-MOORE MINIATURE PIGS,
Iowa Univ., Iowa City. Dept. of Pediatrics.
T. A. Anderson, L. J. Filer, Jr., S. J. Fomon, D. W. Andersen, and T. L. Nixt.
Journal of Nutrition, Vol 104, No 5, p 619-628, May 1974. 1 fig, 6 tab, 24 ref. PHS (HD-01784).

Descriptors: *Absorption, *Iron, *Diets, *Hogs, Inorganic compounds, Laboratory animals, Animal physiology, Laboratory tests, Protein, Spectroscopy.

Prevention of Fe deficiency was studied with eight Pitman-Moore miniature pigs in each of seven groups. From 5 to 33 days of age the animals received identical cereal-milk diets except for Fe content: diet 1, no added Fe (8 ppm); diet 2, ferrous sulfate; diet 3, catalytically reduced Fe; diet 4, electrolytic Fe powder; diet 5, sodium Fe pyrophosphate; diet 6, ferripolyphosphate powder; diet 7, disodium Fe EDTA. The effect of Fe deficiency anemia on growth performance was statistically significant by week 4 of the study. At that time gain in body weight was highly correlated (P less than 0.01) with concentration of hemoglobin. The most available forms of Fe are also the forms most likely to promote rancidity of cereals. Ferrous sulfate, a highly available Fe source is notorious in this regard. The ferripolyphosphate powder was fed to miniature pigs, but apparently possesses the undesirable property of promoting rancidity in cereal products. The Fe EDTA complex is stable in this regard and because of its high availability deserves further study as a potential source of Fe in infant cereals. (Jernigan-Vanderbilt)
W75-03083

TRACE ELEMENTS IN THE BOTTOM DEPOSITS OF RESERVOIRS ON THE DNIEPER RIVER,
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
Ye. P. Nakhshina.
Soviet Hydrology, Selected Papers No 3, p 250-257, 1973. 1 fig, 8 tab, 32 ref. Translated from Hydrochemical Materials (Gidrokhimicheskiye materialy), Hydrochemical Institute, Novocherkassk, Vol 57, p 30-38, 1973.

Descriptors: *Trace elements, *Heavy metals, *Reservoirs, *Bottom sediments, *Path of pollutants, Soil chemical properties, Self-purification, Copper, Cobalt, Manganese, Zinc, Adsorption, Hydroscopic water, Hydrogen ion concentration, Oxidation-reduction potential, Microorganisms,aorganic matter, Silts, Algae, Correlation analysis, Water pollution sources.
Identifiers: *USSR(Dnieper River).

The main factor determining the content and distribution of trace elements in the bottom deposits of reservoirs on the Dnieper River is the content of organic matter in them, as evidenced by the high correlation coefficients between their average valves. The correlation with organic matter decreases in the series Zn - Cu - Co - Mn. The sites of considerable trace element concentration in all the reservoirs are bays and inlets, whose bottom deposits contain a large amount of organic matter: the Glebovskiy inlet in the Kiev Reservoir, the Tyasminskiy and Adamovskiy inlets in the Kremenchug Reservoir, the Vorskylyanskiy inlet in the Dneprodzerzhinsk Reservoir, the Samarskiy and Vol'nyanskiy inlets in the Lenin Reservoir, and the Chertomlykskiy and Rogachinskiy inlets in the Kakhovka Reservoir. The trace elements studied in bottom deposits can be expanded in the following series according to their auto-correlation: Zn-Co(Cu) greater than Mn-Co greater than Mn-Cu (Zn). (Visocky-ISWS)
W75-03086

V 8 6 M R 1 5 7 5 UMI

PHYSICAL AND CHEMICAL QUALITY OF AGRICULTURAL LAND RUNOFF,
South Dakota School of Mines and Technology, Rapid City.
L. L. Harms, J. N. Dornbush, and J. R. Anderson.
Journal Water Pollution Control Federation, Vol 46, No 11, p 2460-2470, November 1974. 3 fig, 7 tab, 23 ref. EPA Project No R-800400.

Descriptors: *Nutrients, *Rainfall, *Runoff, *Snowmelt, *Path of pollutants, Agriculture, Drainage, Overland flow, *South Dakota, Surface runoff, On-site data collections, Sampling, Agricultural runoff, Water quality, Rainfall-runoff relationships, Physical properties, Chemical properties, Water pollution sources.

Surface runoff from snowmelt and rainfall was measured on seven sites in eastern South Dakota during a 2-year period. The sites ranged in size from 7.18 to 18.69 acres and were farmed under normal farming conditions with crops of corn and oats, and pasture or hay land. Samples were taken periodically throughout each runoff event, and a single composite sample was made to represent the entire runoff event. Various chemical and physical determinations were made on the composite samples from 91 snowmelt events and 32 rainfall events. Basic project objectives were to fine the concentrations of various pollutional constituents and to determine the total annual contribution of those constituents. Annual soil losses were lower than expected and almost all were attributed to rainfall runoff. Considerable quantities of nutrients were present in the agriculture runoff. Most of the annual nutrient load for the study area came from snowmelt runoff, and a large percentage was soluble. (Harmeson-ISWS)
W75-03091

NITRATE CONCENTRATIONS IN STREAMS NEAR ALLISTON, ONTARIO, AS INFLUENCED BY NITROGEN FERTILIZATION OF ADJACENT FIELDS,
York Univ., Downsview (Ontario).
A. R. Hill, and W. P. McCague.
Journal of Soil and Water Conservation, Vol 29, No 5, p 217-220, September-October 1974. 3 fig, 9 ref.

Descriptors: *Path of pollutants, *Agricultural runoff, *Fertilizers, *Nutrients, *Nitrogen compounds, *Canada, Streams, Measurement, Agriculture, Sampling, Water quality, Water pollution sources.
Identifiers: Bailey Creek, Inisfil Creek, Nottawasaga River, Ontario.

Measurements of nitrate-nitrogen concentrations at a number of stream sampling sites associated with three fertilized fields revealed considerable increases in nitrates as the streams flowed past the fields. Maximum nitrate-nitrogen levels ranged from 3 mg/l near a sod field to almost 10 mg/l downstream from a series of potato and tobacco fields. Sampling sites were located so that upstream, downstream, and mid-field examinations could be made to measure changes in nitrate concentrations with increased distance from areas of fertilizer application. The relationships between well-defined peaks in nitrate-nitrogen concentration and dates of fertilizer application suggested that nitrogen fertilizer was the source of the increased stream nitrate levels. (Harmeson-ISWS)
W75-03092

EFFECTS OF RECREATION ON WATER QUALITY,
Idaho Univ., Moscow. Coll. of Forestry, Wildlife and Range Sciences.
For primary bibliographic entry see Field 5C.
W75-03094

JET-FORCED CIRCULATION IN WATER-SUPPLY RESERVOIRS,
Karlsruhe Univ. (Germany).
R. J. Sobey, and S. B. Savage.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY12, Proceedings Paper 11026, p 1809-1828, December 1974. 5 fig, 3 tab, 9 ref, 3 append.

Descriptors: *Water circulation, *Water quality, *Reservoirs, *Mathematical models, Pumped storage, Hydraulics, Currents(Water), Flow, Pumping, Reynolds number, Water quality control, Jets.
Identifiers: Jet Reynolds number.

A detailed understanding of the large-scale current motions in reservoirs is a fundamental prerequisite to their successful water quality management. A theoretical and experimental study of the throughflow-forced circulating flow within a reservoir gyre of simplified geometry was presented. Dimensional analysis and flow visualization were used to define the essential features of the flow. An integral-type mathematical model, containing no free parameters, was then presented and subsequently verified against laboratory experiments. This mathematical model was extrapolated to a real-reservoir parameter range to define a jet-forced circulation diagram. This diagram, which should be useful in the preliminary design of water-supply reservoirs, nondimensionally relates the jet-forced circulation to: (1) the reservoir aspect ratio and the boundary roughness; (2) the jet Reynolds number; and (3) the jet geometry having been shown to be relatively unimportant. (Jess-ISWS)
W75-03095

INTERBASIN GROUND-WATER FLOW IN SOUTHERN NEVADA,
Mackay School of Mines, Reno, Nev.
For primary bibliographic entry see Field 2F.
W75-03096

RADIAL DISPERSION IN GROUND-WATER FLOW,
Canterbury Univ., Christchurch (New Zealand). Dept. of Civil Engineering.
B. W. Hunt.
Journal of the Engineering Mechanics Division, American Society of Civil Engineers, Vol 100, No EM6, Proceedings Paper 10998, p 1117-1127, December 1974. 3 fig, 7 ref, 2 append.

Descriptors: *Dispersion, *Injection wells, *Path of pollutants, Waste disposal wells, *Diffusion, Recharge, *Groundwater movement, Boundary layers, Aquifers, Aquifer characteristics, Numerical analysis, Pollutants, Porosity, Mixing, Radioactive waste disposal, Groundwater recharge, Laplaces equation, Hydraulics, Water pollution, Radioactivity, Seepage.
Identifiers: Perturbation techniques.

Singular perturbation techniques were used to obtain approximate concentration distributions that result when a recharge well discharges a finite volume of radioactive pollutant into an aquifer. Solutions were obtained for both a line source and a point source discharging into a flow that is at rest at infinity. The approximate solutions are relatively easy to apply and require that e is much less than 1, which is a condition that is usually satisfied in many applications. (Visocky-ISWS)
W75-03100

HYDROLOGY OF 7-DAY 10-YR LOW FLOWS,
Illinois State Water Survey, Urbana. Hydrology Section.
K. P. Singh, and J. B. Stall.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY12, Proceedings Paper 11013, p 1753-1771, December 1974. 8 fig, 3 tab, 7 ref, 1 append.

Descriptors: *Low flow, Hydrology, *Drainage area, *Waste water disposal, *Urbanization, *Waste dilution, Streams, Hydraulics, Recreation, Lakes, Regulated flow, Sewage effluents, Sewage treatment, Waste water treatment, Waste pollution control, *Path of pollutants.
Identifiers: 7-day 10-yr low flow, Stream entrenchment, Concurrent low flows.

The level of treatment necessary for maintaining stream quality depends on the dilution ratio, defined as the ratio of the 7-day 10-yr low flow in the stream to the average dry weather flow from the treatment plant. The natural low flows depend on physiography, baseflow regime, stream entrenchment, flood-plain development, magnitude of the drainage area of the stream, etc. The natural low flows are modified by recreational pools created by in-river impoundments, reservoirs or lakes for recreation and regulation of flows, urbanization, municipal and industrial water use and wastewater treatment plant effluents, and navigation pools. Downstream of the confluence of two major streams draining hydrologically dissimilar areas, the low flow exceeds the sum or the two individual low flows, because they are out of phase with each other. Examples were presented showing the effect of these factors on the 7-day 10-yr low flow in streams. (Singh-ISWS)
W75-03104

APPLICATION OF REMOTE SENSING TO STATE AND REGIONAL PROBLEMS,
Mississippi State Univ., State College. Inst. for Environmental Studies.
For primary bibliographic entry see Field 6B.
W75-03107

SEWAGE-SLUDGE AND TRANSMISSION CYCLES OF SALMONELLAE, (IN GERMAN),
Zurich Univ. (Switzerland). Veterinary Bacteriology Inst.
E. Hess, G. Lott, and C. Breer.
Zentrabl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med, Vol 158, No 5, p 446-455, 1974.

Descriptors: *Sludge, *Sewage disposal, *Salmonella, Aerobic bacteria, Bacteria, Microorganisms, Enteric bacteria, Sewage bacteria, Sludge treatment, Water pollution sources, Waste water treatment.
Identifiers: Irradiation, Pasteurization.

In 219 specimens of sludge from 44 different sewage disposal plants, salmonellae were present in 83.6%. The maximum number of organisms reached 10 to the seventh power/l. Neither aerobic stabilization nor anaerobic digestion significantly reduced the contamination with salmonellae. Salmonellae were isolated in 91.8% of raw sludge samples, in 78.1% of aerobic stabilized samples and in 81.9% of anaerobic digested samples. The average concentration of salmonellae in raw sludge was 10 to the fifth power/l; in totally digested sludge, in spite of the treatment, still 10 to the third power/l. The survival time of salmonellae was investigated experimentally under controlled conditions. Blades of grass were dipped in sludge artificially contaminated with salmonellae. The organisms survived in a dry atmosphere at least 40-58 wk. Because various transmission cycles, sewage-sludge-plants-animals, are possible, the various methods of sanitizing sludge presently available were examined. In 2 plants tested, pasteurization resulted in elimination of Enterobacteriaceae in 93 and 99%, respectively of 1 g samples. A dose of 300 krad gamma irradiation resulted in a death rate of 10 to the fourth power-10 to the eighth power and 10 to the ninth power enterobacteria, respectively.--Copyright 1974, Biological Abstracts, Inc.
W75-03114

REMOTE SENSING REPORT, MAJOR WATERWAYS, MEMPHIS, TENNESSEE VICINITY.
National Field Investigations Center, Denver, Colo.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-230 431, $4.75 in paper copy, $2.25 in microfiche. April 1972. 75 p, 4 fig, 1 append.

Descriptors: *Water pollution sources, *Surveys, *Remote sensing, *Tennessee, On-site investigations, Evaluation, Storm drains, Ditches, Drainage, Domestic wastes, Mississippi River, Interceptor sewers.
Identifiers: *Memphis(Tenn), Nonconnah Creek(Tenn), Wolf River(Tenn), Loosahatchie River(Tenn), McKellar Lake(Tenn).

A second aerial remote sensing reconnaissance mission was flown over Memphis on February 17, 1972. The timing of this mission coincided with field operations of a ground-survey team studying the following five waterways: (1) Nonconnah Creek, from a point approximately four miles east of the intersection of Mt. Moniah Road and Interstate 240 downstream of its outflow into McKellar Lake; (2) Wolf River, from a point approximately true north of Collierville, Tennessee, to its confluence with the Mississippi River; (3) Loosahatchie River, from a point approximately due south of Millington, Tennessee, to its confluence with the Mississippi River; (4) McKellar Lake, in its entirety; and (5) Mississippi River, from a point adjacent to Beef Island downstream approximately to the Tennessee/Mississippi State Line. Twenty-eight outfalls and drainage ditches were identified in the airborne imagery recorded. At the time of imaging, these 28 sites showed sufficient indications that they were or had the potential of introducing polluted effluence into the five waterways. The most significant effluent in the area appeared to be that of nearly raw sewage. Numerous ditches throughout the target area appeared to serve only as natural drainage. (Humphreys-ISWS)
W75-03115

EXPLORATORY FIELD STUDY OF A GROUND WASTE DISPOSAL FACILITY,
Hanford Atomic Products Operation, Richland, Wash.
W. A. Haney, and C. E. Linderoth.
Available from the National Technical Information Service, Springfield, Va 22161 as HW-60115, $4.00 in paper copy, $2.25 in microfiche. Preliminary Report, May 1959. 22 p, 2 tab, 7 ref, 1 append.

Descriptors: *Radioactive wastes, *Radioactive waste disposal, Strontium radioisotopes, Soil contamination, Water pollution, Ion exchange, Cesium, On-site investigations, Drilling, Sampling, Geologic investigations, *Path of pollutants.

In 1956 an extensive well drilling and soil sampling program was carried out in the vicinity of the Redox 216-5-1 and 2 cribs. The purpose of the program was to study the distribution of radioisotopes in the soils beneath the cribs. Data obtained from soil and water samples indicated that waste spread from an initial distribution point of 4000 sq ft to an area of 80,000 sq ft at the water table. Geologic data could be used to predict directions of waste movement and the extent of spreading. While it is unlikely that this method of exploring a waste disposal facility will provide sufficient data to make an accurate material balance around a facility, it is within the range of such investigations to obtain results which have application in defining the types and concentrations of radioisotopes in particular soil zones. (Gibb-ISWS)
W75-03117

A MATHEMATICAL SIMULATION MODEL FOR THE MOVEMENT OF WATER AND NITRATE IN THE SOIL PROFILE,
Illinois Univ., Urbana. Dept. of Agricultural Engineering.
F. Kolonda.
Ms Thesis, 1974. 122 p, 15 fig, 3 tab, 71 ref, 2 append.

Descriptors: *Nitrates, *Soil water, *Soil profiles, *Mathematical models, Soil water movement, Soil-water-plant relationships, Irrigation water, Irrigation efficiency, Infiltration, Unsaturated flow, Soil-physical properties, Solutes, Diffusion, Soil microorganisms, Temperature, Crops, Agriculture, Leaching, Herbicides, Pesticides, Flow system, Denitrification, Fertilization, Evapotranspiration, *Path of pollutants.
Identifiers: Exchange phenomena, State moisture regimes.

The possibility of computing nitrate flow with water in unsaturated cropped field soils was demonstrated. Lack of data on various model parameters necessitated some gross assumptions at this stage. The model should be useful in the analysis of experimental studies of the movement of non-interacting solutes in soil. The method can be modified to take into account diffusion, exchange phenomena, activities of soil microflora to release or to immobilize nitrate in the soil, and temperature effects. The model can be applied for evaluating the efficient combinations of quantity and quality of irrigation water applied to various crops in accordance with the nitrate distribution within the soil profile. It can be applied to agricultural problems such as leaching soils and movement of herbicides and pesticides in soil. The method can be modified to take into account the flow in two or three dimensional systems. The practical usefulness of the model in providing a framework for the analysis of flow of water and nitrate through the soil profile can be determined only after it is tested with actual data, and the needed modifications in the model parameter values are so adjusted by a trial and error procedure. (Visocky-ISWS)
W75-03119

AN ECOLOGICAL APPROACH TO THE PROBLEM OF BIODEGRADATION OF PHENOLIC WASTES,
Trinity Univ., San Antonio, Tex.
For primary bibliographic entry see Field 5D.
W75-03125

HYDROLOGIC RELATIONSHIP OF JEFFERSON COUNTY LANDFILL LEACHATE AND MERAMEC HEIGHTS AREA SPRINGS,
National Field Investigations Center, Denver, Colo.
J. V. Rouse.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-227 040, $3.25 in paper copy, $2.25 in microfiche. April 1973. 24 p, 6 tab, 1 fig, 6 ref.

Descriptors: *Water pollution sources, *Landfills, *Leachate, Pollution abatement, *Missouri, Water pollution control, Heavy metals, Public health, Tracers, Groundwater movement, Infiltration, Hydrology.
Identifiers: Jefferson County(Missouri).

During the 1967-68 period, a small head of hollow landfill operation handling domestic and industrial wastes was initiated on the northwest side of Teligman Creek, an intermittent stream in Jefferson County, Missouri. Subsequently, signs of deterioration in adjacent streams were observed. In November 1971, EPA joined other agencies in investigating the relationship between the landfill and the observed environmental degradation. Several independent studies were conducted to determine microbiological activity and heavy metal concentrations at the landfill and stream sites. A dye and chemical tracer study was also conducted to determine the relationships between Kohls springs, the landfill leachate, and the nearby Meramac River. Results indicate a definite hydraulic relationship between the three points. A possible connection was also indicated between the leachate and Averback and Konert Springs. Present remedial actions--construction of leachate holding ponds and movement of the landfill operation upstream--have reduced pollution levels. However, it was still recommended that the landfill be closed, the site be graded and sealed to minimize infiltration and drains be installed to limit groundwater movement through the refuse. (Schroeder-Wisconsin)
W75-03128

AN OUTBREAK OF HEPATITIS-A ASSOCIATED WITH RECREATIONAL LAKE WATER,
Center for Disease Control, Atlanta, Ga. Viral Disease Branch.
For primary bibliographic entry see Field 5C.
W75-03149

A METHOD FOR THE RELATIVE CLASSIFICATION OF LAKES IN THE STATE OF WASHINGTON FROM RECONNAISSANCE DATA,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 2H.
W75-03152

SEAWATER INTRUSION, GROUND-WATER PUMPAGE, GROUND-WATER YIELD, AND ARTIFICIAL RECHARGE OF THE PAJARO VALLEY AREA, SANTA CRUZ AND MONTEREY COUNTIES, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
K. S. Muir.
Geological Survey Water-Resources Investigations 9-74, October 1974. 31 p, 16 fig, 2 tab, 12 ref.

Descriptors: *Saline water intrusion, *Groundwater movement, *Artificial recharge, *California, *Path of pollutants, Hydrogeology, Withdrawl, Injection wells.
Identifiers: *Pajaro Valley(Calif).

Seawater intrusion is occurring in Pajaro Valley, California from several miles north to several miles south of the mouth of the Pajaro River and in a small area about 4 miles north of the river. The intrusion extends inland about 1 mile. Two water-bearing zones are being intruded--the depth intervals 100-200 feet and 300-600 feet. Groundwater pumpage averaged 49,100 acre-feet per year for the 9-year period 1963-71. The long-term groundwater yield of the Pajaro Valley is about 44,000 acre-feet per year. Artificial recharge can be effected through modified streambeds at filtration rates as high as 3 feet per day. Injection wells my have recharge capabilities of as much as 500 gallons per minute. (Knapp-USGS)
W75-03154

ANNOTATED BIBLIOGRAPHY OF THE EFFECTS OF WATER ON THE DESIGN AND MANAGEMENT OF LAKE AND RIVER MARINAS,
Wisconsin Univ.-Parkside, Kenosha. Dept. of Earth Science.
L. C. Ruedisili, J. A. Hanson, and T. H. DeFouw.
Sea Grant Advisory Report No 7, WIS-SG-74-407, August 1974. 65 p, 191 ref.

Descriptors: *Bibliographies, *Water quality, *Circulation, Harbors, Shores, Marinas, Lakes, Rivers, *Mixing, Management, Pollution.
Identifiers: *Flushing, Coastal zone, Coastal processes, Shoreline modification.

This bibliography contains 191 literature references on the effects of water on the design and management of lake and river marinas. The references are listed alphabetically by author for the following topics: (1) water quality, (2) flushing-mixing-circulation, (3) harbor improvement, and (4) shoreline modification and coastal zone. (NOAA)
W75-03171

THE GREAT LAKES REDISCOVERED,
Wisconsin Univ., Madison. Marine Studies Center.
R. A. Ragotzkie.
American Scientist, Vol 62, No 4, p 454-464, July-August 1974. 6 fig, 1 tab, 51 ref.

Descriptors: *Lakes, *Eutrophication, *Fisheries, *Recreation, Lake Superior, Lake Michigan, Lake Huron, Lake Erie, Lake Ontario, Circulation, Hydrology, DDT, Polychlorinated biphenyls, *Great Lakes, Pollutant identification, Water pollution sources.
Identifiers: *Thermal structure, Oscillation, Microcontaminants.

An overall view of the condition of the Great Lakes is presented. Following a brief review of the geology and hydrology of the Great Lakes summaries are given on both eutrophication and pollution. The plight of the lakes is discussed with reference to the major uses--commercial fishing, water supply and waste disposal, and recreation. Information is given on research underway, studies on thermal structure, circulation, oscillations, its oceanic characteristics, its fisheries and microcontaminants. The need for continuing efforts to preserve the priceless resources is emphasized. (Sinha-OEIS)
W75-03173

PP'-DDT ADSORPTION TO SUSPENDED PARTICULATE MATTER IN SEA WATER,
Rhode Island Univ., Kingston. Dept. of Food and Resource Chemistry.
R. H. Pierce, Jr., C. E. Olney, and G. T. Felbeck, Jr.
Geochimica et Cosmochimica Acta, Vol 38, p 1061-1073, 1974. 5 fig, 5 tab, 35 ref. (Also as Rhode Island Univ Experiment Station Contribution No 1495.) NOAA 04-3-158-3.

Descriptors: *Estuaries, *Pesticides, *Water pollution sources, *Insecticides, *DDT, Ecosystems, Path of pollutants, Bottom sediments, Clays, Sediments, Humic acids, Sea water, *Adsorption, Suspended solids,
Identifiers: *Marine sediments, Chlorinated hydrocarbons, Suspended sediments, Particulate matter, Suspended particulates.

A procedure was devised to study pp'-DDT (2,2-bis(p-chlorophenyl)-1,1,1-trichloroethane) adsorption and desorption to suspended particulates in aqueous solutions. DDT adsorption to a marine sediment, sediment fractions, clay and humic acid suspended in sea water was investigated and the humic fraction was found to have a greater adsorbing capacity than the clay or sediment. Removal of the humic fraction from sediment reduced the adsorption capacity to less than 50 per cent of the original sediment sample. It was concluded that suspended humic particulates may be important agents for transporting chlorinated hydrocarbons through the water column and for concentrating them in sediments and in detritus-feeding organisms. (NOAA)
W75-03174

MARINE STUDIES OF SAN PEDRO BAY, CALIFORNIA. PART VII. SEDIMENT COMPOSITIONS IN LOS ANGELES-LONG BEACH HARBORS AND SAN PEDRO BASIN,
University of Southern California, Los Angeles. Environmental Engineering.
K. Y. Chen, and J. C. S. Lu.
Southern California University, Allan Hancock Foundation, Sea Grant Report USC-SG-8-74, August 1974. 177 p, 120 fig, 9 tab, 111 ref. NOAA 04-3-158-145.

Descriptors: *Pollutants, *Harbors, *Ecosystems, *Chlorinated hydrocarbon pesticides, *Polychlorinated biphenyls, Sediments, Dredging, *Metals, Water pollution, Organic matter, Pesticides, Outfall sewers, *California, Trace elements.
Identifiers: *Trace metals, *San Pedro(Calif).

Most surface sediments in the Los Angeles-Long Beach Harbors and nearby San Pedro Basin are grossly contaminated, with the exception of a few localities. Restricted dredging of polluted sediments from fractional areas of the harbor complex is probably beneficial to the ecosystem if the polluting substances can be properly disposed of. The Los Angeles County Sanitation District sewer outfall at White's Point is found to contribute substantial amounts of trace metals and chlorinated pesticides to the San Pedro Basin, while the harbor complex is found to be an important source of polychlorinated biphenyls into the San Pedro Basin. Interrelationships of pollution parameters are presented. (NOAA)
W75-03176

APPLIED MATHEMATICAL MODELING OF THE OXYGEN DISTRIBUTION IN A MISSISSIPPI STREAM,
Mississippi State Univ., State College.
U. F. Deegen.
Sea Grant Publication No MSGP-72-006, August 1972. 69 p, 6 tab, 38 ref, append. (M S Thesis).

Descriptors: *Mathematical models, *Computer programs, *Dissolved oxygen, *Mississippi, Rivers, Oxygen, Surveys, Model studies, *Biochemical oxygen demand.

The mathematical model presented was designed to accept data for the various sources of dissolved oxygen and biological oxygen demand accounting for the various inputs and outputs of the aquatic system. It represents a compilation of existing programs; like other methods of this type, the basic equation is that of Streeter and Phelps. Modifications center about the reduction of essential input data such that the oxygen distribution may be approximated with a minimum of sampling. Verification of the computer program was made on a nontidal reach by comparing computed final dissolved oxygen to observed field dissolved oxygen measurements. The program proved to be fundamentally sound and workable by yielding accurate results with hypothetical problems as well as with the actual stream survey. (Sinha-OEIS)
W75-03184

ENTERIC BACTERIOPHAGES IN SAINT LOUIS BAY, MISSISSIPPI,
Mississippi Univ., University. Dept. of Biology.
J. O. Graves, Jr.
Mississippi-Alabama Consortium, Ocean Springs, Miss, Sea Grant Publication No MSGP-73-003, May 1972. 27 p, 1 fig, 6 tab, 20 ref. (Master's Thesis).

Descriptors: *Enteric bacteria, *Water pollution sources, *Environmental effects, Bays, *Mississippi, Bottom sediment, Fishes, Oysters, Shellfish, Bacteria, Salmonella, Viruses.
Identifiers: *Enteric bacteriophages, *Viral pathogens, *Saint Louis Bay(Miss), Bottom water, Seasonal variations, Pathogens, Fecal matter, Escherichia coli, Enterobacter aerogens, Salmonella schottmuelleri, Shigella alkalescens, Sea Grant Program.

Samples from four stations in Saint Louis Bay, Mississippi were examined monthly for the presence of enteric bacteriophages over the period from July 1971 to March 1972. The samples were of surface and bottom water, bottom sediment, and surface and gut of fish and oysters. Host bacteria tested were Escherichia coli, Enterobacter aerogenes, Salmonella schottmuelleri and Shigella alkalescens. No bacteriophages for Salmonella schottmuelleri or Shigella alkalescens were detected. Bacteriophages of Escherichia coli and Enterobacter aerogenes were isolated regularly, most commonly from surface water samples. MPN estimations of E. coli bacteriophage concentrations in surface water samples were determined over the period from December to March. Wide variations in E. coli bacteriophage concentrations were encountered. The data indicated a pattern of seasonal variation. This method provided a rapid and simple means for estimation of coliphage concentrations in water. Enteric bacteriophages could possibly be used as indicators of viral pathogens of fecal origin in water in a manner similar to the present use of coliforms. Comparisons of E. coli bacteriophage and enteric virus survival in water are necessary to determine the usefulness of these bacteriophages as indicators in routine water quality tests. (NOAA)
W75-03185

STANDARDS FOR EFFLUENTS FROM FERTILIZER INDUSTRY,
Indian Standards Institution, New Delhi.
For primary bibliographic entry see Field 5D.
W75-03187

SOURCES CHARACTERISTICS OF LIQUID AND GASEOUS EFFLUENTS FROM FERTILIZER PLANT,
Fertilizer Corp. of India, Trombay.
S. K. Mitra.
Indian Journal of Environmental Health, Vol 15, No 4, p 322-328, October 1973. 1 tab.

Descriptors: *Fertilizers, *Industrial wastes, *Industrial plants, *Solid wastes, *Liquid wastes, Water pollution sources, Water pollution effects, Water pollution control, Environmental effects, Dusts, Organic compounds, Oxides, Sulfides, Fluorides, Color, Temperature, Odor, Turbidity, Hydrogen ion concentration, Ammonia, Arsenic compounds, Phosphorus, Nitrates, Nitrites, Sulfates, Oil, Biochemical oxygen demand, *Air pollution.

Environmental pollution caused by the fertilizer industry is discussed with regards to gaseous emissions, liquid effluents, and solid wastes. The sources, effects, and possible control measures for pollutants under these categories are indicated. (Sandoski-FIRL)
W75-03188

PHOTOSYNTHETIC PHYTOPLANKTON ACTIVITY IN THE IVANKOVO RESERVOIR, IN THE ZONE OF HEATED WATER FROM THE KONAKOVO STATE REGIONAL ELECTRIC POWER STATION, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
For primary bibliographic entry see Field 5C.
W75-03193

ACTIVATED SLUDGE PH SHOCK.
For primary bibliographic entry see Field 5D.
W75-03194

ACID RAIN: FOSSIL SULFUR RETURNED TO EARTH,
Massachusetts Audubon Society, Lincoln.
I. C. T. Nisbet.
Technology Review (M.I.T.), Vol 76, No 4, p 8-9, February 1974. 1 fig.

Descriptors: *Water pollution sources, *Water pollution effects, *Rainfall, Acidity, *Hydrogen ion concentration, *Fossil fuels, *Sulfur compounds, *Acidic water, *Air pollution, Fuels, Incineration, Industrial wastes, Fish, Forest soils, Soil contamination, Soil chemistry, Water chemistry.
Identifiers: Sulfur dioxide, Sulfuric acid.

The burning of fossil fuels introduces annually ca. 100-150 million tons of sulfur dioxide into the atmosphere, which yields ca. 200 million tons of sulfuric acid. Natural and man-made sulfuric acid produces ca. 4 million tons of hydrogen ions in the northern hemisphere. Without man's input, the pH of rainwater in equilibrium with carbon dioxide

would be ca. 5.8, but with 4 million tons of H ions it will be ca. 4.8, even under full mixing conditions. Most acidic fallout is concentrated in eastern Canada, the northeastern USA, and northern Europe, where soils are acid and poorly buffered against additional leaching. Reproductive failure and death occur among fish if water pH falls much below 5. The net productivity of Scandinavian forests is falling, owing to acidification, probably because of decreases in soil calcium. Dilution will not eliminate acid rain. Without fuel standards, the only solution is to install stack recovery systems. (McClenahan-IPC)
W75-03197

INTERNATIONAL JOURNAL OF MEDICAL OCEANOGRAPHY SUPPLEMENT. MARINE POLLUTIONS AND SHORELINE MANAGEMENT,
M. Aubert, and J. Aubert.
Centre d'Etudes et de Recherches de Biologie et d'Oceanographie Medicale: Nice, France, 1973, 309 p.

Descriptors: *Water pollution sources, Pollutants, Water pollution, *Shore protection, *Shores, Littoral, *Coasts, Pollution, Water pollution control, Management, Oceans.

This book presents practical data dealing with the economic, ecological, legislative and administrative problems and current methods available in the fight against the effects of littoral pollution. Part 1 includes a description of the various forms and sources of marine pollution--thermal, bacterial, radioactive, chemical, secondary organic pollutants and their effect on the marine and atmospheric biological equilibrium. Part 2 outlines different oceanographic techniques for measuring these pollutions and covers numerous meteorological, topographic, hydrologica, biological and chemical analytic methods. In part 3 are presented guidelines for the management and protection of coastal areas, including studies of off-shore waste dumping and the effect of pollution on the management of waterways' outlets, ports and artificial beaches. This systematic organization of relevant data is intended as a reference aid for those individuals and agencies involved in the formulation of programs for littoral pollution control.--Copyright 1974, Biological Abstracts, Inc.
W75-03207

OIL POLLUTION IN THE IZU ISLANDS WATERS, (IN JAPANESE),
Tokyo Metropolitan Fisheries Experiment Station (Japan).
M. Ohya, T. Otsuki, and M. Saito.
J Oceanogr Soc Jap, Vol 29, No 3, p 121-129, 1973.

Descriptors: *Oil pollution, Asia, *Water pollution sources, Pollution, Oily water, *Pollutant identification.
Identifiers: *Japan(Izu Islands).

Globules and lumps of oil were collected (2.56 g average wet weight) by each tow (174 cu m) of a larval net at 389 stations, up to a maximum collection of more than 500 g. During investigation of the Oshima-Torishima line, more globules and lumps of oil were collected south than north of the Kuroshio Current. In the coastal region of Japan, many globules and lumps of oil were collected when a cold water mass was located at the west side of the Izu Islands, south and east of where the Kuroshio Current took a roundabout and closed near to the Boso peninsula (Aug. 1971, June 1972, Aug. 1972), or when the Kuroshio Current took a roundabout the cold water mass which extended as far as Oshima from the coast of the Boso peninsula (Sept. 1971).--Copyright 1974, Biological Abstracts, Inc.
W75-03209

BIOLOGY AND HEALTH PHYSICS DIVISION, PROGRESS REPORT OF ENVIRONMENTAL RESEARCH BRANCH, JULY 1 TO SEPTEMBER 30, 1973,
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
I. L. Ophel.
Available from Atomic Energy of Canada, Limited, Chalk River, Ontario, $1.50 per copy. Report No PR-B-99, February 1974. p 33-50, 3 fig

Descriptors: *Radioactivity, Assay, Measurement, Assessment, Laboratories research facilities, *Background radiation, Effluents, Potable water, Water pollution, Ecology, Ecosystems, Water pollution sources, Hydrology, Iron, Tritium, Strontium, Calcium, Regulations, Public health, *Canada.
Identifiers: *Perch Lake(Ont), *Chalk River(Ont).

The concentrations of radionuclides in all effluent streams from the Chalk River Nuclear Laboratories (CRNL) during the period July 1-Sept 30, 1973 remained below International Committee on Radiation Production (ICRP) permissible levels for drinking water. Measurements of background radiation with lithium fluoride dosimeters at eight stations on the Project boundary have now been placed on a routine basis. Preliminary analyses of various fractions of organic matter from various parts of the Perch Lake ecosystem have shown interesting differences which may be related to origin and structure. The finding of large amounts of bound iron in some fractions is suggestive that these materials play a part in the binding and distribution of elements (and radionuclides) in the ecosystem. Hydrological work during the summer has been concentrated in the Perch Lake Basin. Results from drill holes and bedrock tests have been used by the University of Waterloo in their study of ground water movement in the Basin and by the Chalk River Environmental Authority for the selection of suitable waste management areas. (Houser-ORNL)
W75-03233

MERCURY IN SOME SWEDISH LAKE SEDIMENTS,
National Swedish Environment Protection Board, Uppsala. Limnological Survey.
L. Hakanson.
Ambio, Vol 3, No 1, p 37-43, 1974, Illus.
Identifiers: *Lake sediments, Lakes, *Mercury, Southern Lake Vattern, Absorption, *Sweden, Lake Bjorken, Lake Eklon, Distribution patterns, *Path of pollutants.

The significance of Hg as a biologically active pollutant has been recognized for more than 15 yr. Increased Hg content of bottom sediments and fish characterizes many water systems as a result of industrial and other types of pollution. Due to the release from contaminated sediments, Hg may continue to contaminate the water environment, even if the discharge of the pollutant is halted. The purpose of this work has been study of some of the factors that influence the distribution of Hg in lake sediments and to give some quantitative data about the situation in 3 different Swedish lakes; Lake Ekoln, Lake Bjorken, and Southern Lake Vattern. Factors that affect the distribution are: the amount and type of mercury discharged; the size, topography, and water turnover of the lake; and the water quality of the lake (pH, nutrition, suspended and dissolved matter). Laboratory tests have indicated that the affinity and distribution of mercury (Hg^{2+}) for inorganic and organic particles show a significant pH dependency. Practically all the Hg in the sediments is adsorbed by organic particles and very little Hg is found in the interstitial water or adsorbed by inorganic materials.--Copyright 1974, Biological Abstracts, Inc.
W75-03270

CITIZEN ENFORCEMENT OF THE REFUSE ACT: QUI TAM PRO DOMINO REGE QUAM PRO SE IPSO IN HOC PARTE SEQUITUR FLOPS; MANDAMUS NEXT,
Natural Resources Journal, Vol 12, No 2, p 298-305, April, 1972. 46 ref.

Descriptors: *Rivers and Harbors Act, *Law enforcement, *Legal aspects, *Judicial decisions, *Water pollution sources, *Water pollution control, Penalties(Legal), Water law, Pollution abatement, Rivers, Water pollution, Public rights, Legislation.
Identifiers: Qui tam actions, Mandamus.

Government apathy toward the problem of water pollution and the recent rediscovery of the long-overlooked Refuse Act have prompted conservation groups to attempt to invoke the provisions of the Act on their own initiative. Through qui tam actions and through attempted mandamus of government agencies charged with enforcement of the Act, the conservation groups have unsuccessfully sought to bring criminal penalties against major industrial polluters. The reasons for the failure of the qui tam actions and the concept of prosecutorial discretion as it relates to the success or failure of mandamus actions brought to force government action under the Refuse Act are analyzed. With some variations, federal courts in all qui tam action have dismissed the cases on grounds of lack of statutory authority, holding that the Act provides a reward for information leading to convictions of polluters, but does not grant a right of private enforcement. Issuance of writs of mandamus may depend, where discretion is the issue, upon the determination of whether such facts exist that a discretionary duty may have become non-discretionary by sheer weight of evidence in favor of performing of requested act. (Ritchie-Florida)
W75-03282

PESTICIDE LEVELS IN ESTUARINE AND MARINE FISH AND INVERTEBRATES FROM THE GUATEMALAN PACIFIC COAST,
Galveston Marine Lab., Tex.
R. K. Keiser, Jr, J. A. Amado-A., and R. Murillo-S.
Bull Mar Sci Vol 23, No 4, p 905-924, 1973. Illus.
Identifiers: Agricultural pollutants, Cotton, DDT, Dormitator-latifrons, Estuarine environment, Fish, *Guatemala, *Invertebrates, *Marine fish, Pacific Ocean, *Pesticide residues, Poecilia-sphenops, Pollution runoff, Shrimp, Toxaphene, Mullet, *Chlorinated hydrocarbon pesticides.

Estuarine and marine fish and invertebrates (27 spp.) were analyzed for chlorinated hydrocarbon residues from July-Nov. 1970. In nonagricultural areas, mullet (Mugil) was the only organism to have DDT concentratiins greater than 1.0 ppm and measurable levels of toxaphene. DDT levels of most organisms were higher in areas bordered by cotton field, and 53% of the samples from these areas had measurable levels of toxaphene. Shrimp from all areas of the coastline had low levels of DDT. A fish kill was observed in a coastal lagoon bordered by cotton fields. In this lagoon, moribund specimens of Dormitator latifrons had DDT residue levels 7 times those found in other areas. Mullet from this lagoon had average DDT levels as high as 36.6 ppm, and DDT concentrations in Poecilia sphenops in 1 mo. exceeded 45 ppm. The cotton-growing season and pesticide application coincided with the utilization of the estuaries by postlarval and juvenile shrimp. Juvenile shrimp were absent from a coastal lagoon receiving agricultural runoff. Poecilia sphenops and Mugil, which comprise a substantial part of the diet of the coastal and highland peoples, consistently had high residue concentrations of DDT and toxaphene.--Copyright 1974, Biological Abstracts, Inc.
W75-03284

210PB AND 210PO CONTENT IN AIR, WATER, FOODSTUFFS, AND THE HUMAN BODY,
Ministerstvo Zdravookhraneniya SSSR, Moscow. Institut Biofiziki.
L. A. Ladinskaya, Y. D. Parfenov, D. K. Popov, and A. V. Fedorova.
Arch Environ Health Vol 27, No 4, p 254-258, 1973.
Identifiers: *Air pollution, Foodstuffs, *Lead-210, *Polonium-210, Potable water, Ingestion(Human), *Radioactive wastes, *Radioisotopes.

Concentrations of 210Pb and 210Po in air, drinking water, foodstuffs and human tissues are reported. The main route of 210Pb and 210Po intake in the human body is ingestion with foodstuffs. The absorption coefficient of 210Po into the blood from the digestive tract was estimated to be 35%. The highest concentration of 210Pb and 210Po in the body was observed in the skeleton and hair. The body burden of humans was 773 pCi of 210Pb and 513 pCi of 210Po. Excretion of these radionuclides from the body in urine was 14-15 times less than in feces. The calculated annual radiation doses of 210Po in the bone, liver and kidneys was 2.1-5.0 mrad/yr, and in other soft tissues, 0.3-0.9 mrad/yr.--Copyright 1974, Biological Abstracts, Inc.
W75-03289

INVESTIGATIONS ON INFLUENCE OF HEATED WATERS FROM THE POWER STATION AT SKAWINA ON SKAWINKA AND VISTULA RIVERS,
Instytut Gospodarki Wodnej, Krakow (Poland). Dept. for Water Protection.
L. Turoboyski.
Pol Arch Hydrobiol Vol 20, No 3, p 443-460, 1973. Illus.
Identifiers: Chemical properties, Ecology, Heated waters, *Poland(Skawina), Pollution, *Power plants, Rivers, Skawinka River(Pol), Vistula River(Pol), *Thermal pollution.

The influence of heated waters discharged from the power station at Skawina, Poland, on river biocenosis and chemical properties of the water in the Skawinda and Vistula rivers was investigated. In the Vistula River, the oxygen content was decreasing and quantitative changes in the biocenosis under the influence of heated water discharges were observed. The highest harmless temperature of heated water was 30C.--Copyright 1974, Biological Abstracts, Inc.
W75-03290

STUDY OF THE CHEMICAL POLLUTION IN MARINE SEDIMENTS IN THE CORTIOU DISTRICT (MARSEILLE): RELATION TO MACROBENTHIC POPULATIONS, (IN FRENCH),
Aix-Marseille-2 Univ. (France). Laboratoire d'Hydrobiologie.
A. Arnoux, D. Auclair, and G. Bellan.
Tethys. Vol 5, No 1, p 115-123, 1973, Illus. English summary.
Identifiers: *Benthic communities, Chemical wastes, *France(M-Marseille), *Sediments(Marine), Organic matter, Sulfur compounds, Phosphates, Detergents, Hydrocarbons, *Path of pollutants.

A comparative study between some pollutants (organic matter, sulfur compounds, phosphates, hydrocarbons and detergents) in sediments in areas with heavy pollution linked with the inflow of the sewers of Marseilles, France, into the open sea and the distribution of communities (and some particular species) was conducted. The data obtained show good correlations between distribution (and amount) of pollutants and localization of communities.--Copyright 1974, Biological Abstracts, Inc.
W75-03291

ECOLOGICAL MAPPING OF CIRCULATING WATER IN BADEN-WUERTTEMBERG, (IN FRENCH),
Baden-Wuerttemberg Landesstelle Gewaesserkunde, Karlsruhe (West Germany).
For primary bibliographic entry see Field 5C.
W75-03293

SURVIVAL OF SMALL AMOUNTS OF COXSACKIE A4 VIRUS IN DANUBE RIVER WATER UNDER LABORATORY CONDITIONS,
Ustav Hygieny a Epidemiologie, Bratislava (Czechoslovakia).
A. Simkova, and Z. Wallnerova.
Acta Virol. Vol 17, No 6, p 505-506, 1973.

Descriptors: Rivers, Europe, *Viruses, Diseases, Water pollution sources, Aquatic microorganisms.
Identifiers: Coxsackie A-4, *Czechoslovakia(Danube River), Picornavirus.

As little as 0.0032 LD 50(50% lethal dose (in suckling mice))/0.01 ml of Coxsackie A4 virus survived for 5 mo. at 4-8 degrees C in Danube River water, whereas in normal saline stability of this small amount of virus could not be demonstrated. In river water samples stored at 20-22 degrees C, the virus was detected through day 45, but only in the sample contaminated with 100 times more virus (0.32 LD50/0.01 ml). A prediction of virus survival potential in Danube River water was made.--Copyright 1974, Biological Abstracts, Inc.
W75-03294

EXPERIMENTAL SIMULATION OF STOCHASTIC STREAM RESPONSE TO THERMAL INPUTS AND APPLICATION OF SPECTRAL ANALYSIS TECHNIQUES,
Kansas State Univ., Manhattan. Dept. of Chemistry.
K. P. Radha Krishnan, J. J. Lizcano, L. T. Fan, and L. E. Erickson.
Water Research, Vol 8, p 455-466, 1974. 19 fig, 2 tab, 15 ref. OWRT B-021-KAN(9). 14-31-0001-3282.

Descriptors: Steam, Flow rates, *Water temperature, *Thermal pollution, Analytical techniques, *Simulation analysis, *Model studies, *Stochastic processes, Mathematical models.
Identifiers: *Spectral analysis, *Thermal discharge, Pulse input, Continuous input, Monitoring positions.

Experimental data on stream temperature were collected using a laboratory model by super-imposing cyclic and continuous non-cyclic thermal discharges (steam was used as the thermal discharge) on the inherently noisy signals of the stream. The resulting data measured at two different points along the stream were processed by spectral analysis. Flow rate and position of measurement were found to play important roles in drawing information from the data. The cyclic nature of the periodic thermal discharge could be observable in the autocorrelation and power spectrum.
W75-03296

5C. Effects Of Pollution

EUTROPHICATION PROBLEMS IN THE ST. LAWRENCE GREAT LAKES,
Wisconsin Univ., Milwaukee. Center for Great Lakes Studies.
A. M. Beeton.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 27-39. 4 fig, 9 ref.

Descriptors: *Great Lakes, *Eutrophication, *Nutrients, *Algae, *Benthos, Plankton, Tropic level, Water pollution effects, Diatoms, Water quality, Water resources, Lake Erie, Lake Ontario, Lake Michigan.

Major nutrient inputs from point sources of industrial and minicipal wastes and from tributaries enter the inshore waters. Consequently, the inshore waters are more eutrophic than those of the open lake. This condition is maintained by continued inputs and eutrophic conditions spread lakeward as input increase. Lake Erie and its spread from near shore waters into the entire lake was cited as a clear demonstration of accelerated eutrophication. Changes in nutrient supply were pointed out as evidence of eutrophication occurring in Lake Erie, Lake Ontario, and southern Lake Michigan. Also noted were observations of increased algal abundance and changes in species composition in these three lakes. The conditions that maintain inshore-offshore differences in nutrient concentrations and diatom abundance and species are not clearly understood, particularly in Lake Michigan. The influence of the biota present was offered as a possible explanation of differences in nutrient distributions. The need for increased study of the nutrients in precipitation and dustfall was stressed in order to improve the calculation of nutrient budgets in lakes. (See also W75-02751) (Harmeson-ISWS)
W75-02754

GAS SUPERSATURATION PROBLEM IN THE COLUMBIA RIVER,
Army Engineer Div. North Pacific, Portland, Oreg. Water Quality Section.
P. B. Boyer.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 104-113. 9 fig.

Descriptors: *Water quality, Fish, *Spillways, *Flow control, *Dams, *Supersaturation, *Fish diseases, Management, Salmon, Hydraulic structures, Fish migration, Nitrogen, Fish conservation, Fish management, Discharge(Water), *Columbia River, Fry, Fishing, Entrainment, Gases, Metabolism, Outlet works.
Identifiers: Fish embolism, Gas bubble disease, Structural modifications, Dissolved nitrogen.

Gas supersaturation, which causes fish embolism, is the most serious water quality problem in the Columbia River. The phenomenon is attributed to spillway-stilling basin action. The plunging water carries with it the entrained air deep into the basin where, under hydrostatic pressure, the constituents of the air go into solution in excess of the normal saturation concentration. The continuous operation of the spillways during spring-summer flood keeps the river supersaturated for nearly 100 days. Field and laboratory investigations are being carried under two major categories: (1) engineering research to provide scientific background for operational and structural modifications that might reduce gas supersaturation levels without significant mechanical damage to fish; and (2) biological research leading to an assessment of the adverse effects of gas supersaturation on fish of various sizes and species under various exposure time, swim depth, and water temperature. (See also W75-02751) (Henley-ISWS)
W75-02759

ENVIRONMENTAL PLANS AND IMPACTS FROM MAN MADE LAKES,
Madhya Pradesh Irrigation Dept., Raipur (India). Irrigation Mahanadi Bodhghat Hasdeo Project.
For primary bibliographic entry see Field 6G.
W75-02772

AVAILABILITY OF ZINC IN LEAVENED AND UNLEAVENED WHOLEMEAL WHEATEN

BREADS AS MEASURED BY SOLUBILITY AND UPTAKE BY RAT INTESTINE IN VITRO,
Nemazee Hospital, Shiraz (Iran). Inst. of Nuclear Medicine.
For primary bibliographic entry see Field 5B.
W75-02830

PANDORA'S BOX OF TOXIC SUBSTANCES,
C. A. Caswell.
Industrial Water Engineering, Vol 10, No 5, p 8, 10, 11, September-October, 1973.

Descriptors: *Toxicity, *Water quality, *Lethal limit, *Water pollution effects, *Aquatic life, Food chains, Bioassay, Pollutant identification, Water pollution control, Chemicals, Effluents, *Toxins, Effects, Human pathology.
Identifiers: Toxic materials.

Factors that have a controlling influence on the level of toxicity of most substances are (1) temperature; (2) pH; (3) dissolved solids; (4) dissolved oxygen; (5) relative concentration of toxic materials; (6) species of organic life forms involved; (7) ages, and/or stage of development, of individual units within the species grouping; (8) synergistic efforts that may occur when two toxic or toxic and non-toxic substances are mixed in the same solution; and length of exposure. Many chemical products, even under low limits of discharge to avoid immediate toxicity, will build up to toxic levels by concentration through the food chain. Long-term effects include non-fatal changes in appetite, metabolism, the nervous system, reproduction, or other vital functions. A substance may have no direct toxic action toward a given species, but it still may result in the eventual elimination of the species by toxic action against one or more of the organisms required in the food chain. For many of the higher forms of life, it is also essential in setting toxicity standards to consider the total intake from alternative sources. Bioassay methods and reporting procedures are explained. (Pulliam-Vanderbilt)
W75-02832

REVERSAL OF SELENIUM TOXICITY IN CHICKS BY MERCURY, COPPER AND CADMIUM,
North Carolina State Univ., Raleigh. Dept. of Poultry Science.
C. H. Hill.
Journal of Nutrition, Vol 104, No 5, p 593-598, May, 1974. 9 tab, 9 ref. NSF(9 ROI HE 14719-10 NTN), NIH(HEW S ROI HL 14719-11 NTN).

Descriptors: *Toxicity, *Poultry, *Mercury, *Copper, *Cadmium, Laboratory animals, Laboratory tests, Inorganic compounds, Diets, Animal pathology, Animal growth, Mortality, Chemical reactions.
Identifiers: *Selenium, Chemical interactions.

The toxic effects of selenium, fed as selenium dioxide, to chicks as measured by growth retardation and mortality could be partially alleviated by the inclusion of mercuric chloride, cupric sulfate, or cadmium sulfate in the diet. The reaction products formed between selenium and the other inorganic compounds were synthesized and fed to chicks and found to be less toxic than an equivalent amount of selenium fed as selenium dioxide. Selenium toxicity was also counteracted by the inclusion of phenylmercuriacetate in the diet. Phenylmercuriacetate fed at a level to supply 50 ppm mercury was itself toxic as indicated by reduction in growth and the toxicity could be partially alleviated by the inclusion of diphenylselenium in the diet. The molar ratio of mercury to selenium for the most effective counteraction of selenium toxicity when the two elements were fed in the inorganic form was 1:1. On the other hand the most effective ratio for counteracting the toxicity of phenylmercuriacetate by diphenylselenium was 4:1 indicating that the mechanisms on which the interactions are based are different in the two instances. (Jernigan-Vanderbilt)
W75-02833

INHIBITING GROWTH OF MICROORGANISMS IN AQUEOUS SYSTEMS,
Givaudan Corp., Clifton, N.J. (assignee)
For primary bibliographic entry see Field 5D.
W75-02844

SIMPLE METHOD FOR INTRODUCING ELEMENTAL MERCURY INTO BIOLOGICAL GROWTH SYSTEMS,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
For primary bibliographic entry see Field 5B.
W75-02862

DRINKING WATER ADDITIVES: PHYSICAL GROWTH AND BEHAVIORAL DEVELOPMENT OF MICE RECEIVING CHLORINE AND FLUORINE,
Connecticut Univ., Storrs. Inst. of Water Resources.
J. Werboff.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-238 313, $3.25 in paper copy, $2.25 in microfiche. Completion Report, 1974. 10 p, 2 tab, 3 ref. OWRT A-043-CONN(2). 14-01-0001-3507.

Descriptors: Water quality, Water treatment, *Additives, Chlorine, *Chlorination, Fluoride, *Fluoridation, Behavior, Reproduction, *Potable water, Growth rates, Water pollution effects.
Identifiers: Successive litters, Successive generations, Mice.

A series of experiments were undertaken to investigate the effects of chlorine and fluorine as water additives on growth and development and behavior in inbred mice. The results of Experiment I and II provide evidence that chlorine may have detrimental effects on selected aspects of learning a water maze for the C57BL/6J strain while fluorine may have beneficial effects on selected aspects of learning a water maze for the A/J strain. The fact that these results are strain specific suggest a specific genetic-water additive interaction. In Experiment III, the cumulative effects of fluoride on reproduction, growth and development, and behavior in successive litters and successive generations were studied. The preliminary results indicate that there is an inverted U-shape function in these responses to fluoride treatment with small and large dosages having similar effects representing both deficiency and toxic states. (de Lara-Connecticut)
W75-02882

AN ECOLOGICAL INVESTIGATION OF THE ACCURACY OF THE FEDERAL STANDARD OF PERMISSIBLE BORON LEVELS TO WATER RESOURCES,
Nevada Univ., Reno. Desert Research Inst.
H. J. Weeth, and G. H. Green.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-238 298, $3.25 in paper copy, $2.25 in microfiche. Completion Report, October 1974. 4 p, 3 ref. OWRT A-053-NEV(4). 14-31-0001-4028.

Descriptors: *Water quality standards, Cattle, Toxicity, Lethal limit, *Boron, Potable water, Livestock, Water quality control.

The purpose was to determine if the Environmental Protection Agency's proposed maximum acceptable concentration of 5 mg/l boron in livestock water is realistic. Twelve Hereford heifers were tested in thirty-day periods. Total daily boron intakes were 215, 4224 and 7219 mg. with tap water, 150 mg/l boron-water and 300 mg/l boron-water treatments, respectively. Renal clearance and/or reabsorption estimates were made on creatinine, osmolites, free water, sodium, phosphate and boron. Effects of treatments on daily urine weight, total dissolved solids, osmotic pressure, sodium, potassium, phosphate and boron were also evaluated. The results showed that the cattle were able to tolerate the high concentration of boron with no permanent effects. The heifers did, however, lose weight, showed a tendency for erythematous swelling, and the concentrations of plasma phosphate were significantly reduced while plasma boron concentrations were higher. This study indicates that cattle can tolerate at least one order of magnitude more boron in their drinking water than the 5 mg/l limit set by the Environmental Protection Agency with no ill effects. (Fallon-Nevada)
W75-02889

THE RELATIONSHIP OF ELECTRIC POWER STATION THERMAL CIRCULATION OF BIOLOGICAL PRODUCTIVITY OF RESERVOIR,
Baylor Univ., Waco, Tex. Dept. of Biology.
O. T. Lind.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-238 375, $5.25 in paper copy, $2.25 in microfiche. Office of Water Research and Technology, US Dept of the Interior Completion Report, January 1974. 110 p, 24 fig, 18 tab, 117 ref. OWRT B-091-TEX(1). 14-31-0001-3339.

Descriptors: *Thermal pollution, *Productivity, *Photosynthesis, Bass, Metabolism, *Texas, Reservoirs, Electric power plants, Phytoplankton, *Absorption, Water pollution effects.
Identifiers: Ostracodes.

Phytoplankton photosynthesis was measured from May 1971-July 1972. Three depths at both the cool intake and warmed discharge of a steam electric station were sampled. 14C innoculated samples were incubated at both the collection and opposite site. Thermal circulation produced no measured negative effects at temperatures below 40C. Photosynthetic carbon uptake was significantly greater in samples collected from and incubated at the warmed discharge than samples from either site and incubated at the cooler intake. At temperatures greater than 40C, a significant depression in photosynthesis occurred. Photosynthesis was often lower in samples from the discharge incubated at the cooler intake than in samples both collected from and incubated at the intake. There was no significant effect on growth, reproduction, or metabolism of the largemouth bass (Micropterus salmoides). The Ostracode (Cypridopsis vidua) from the warmed discharge actively avoided temperatures greater than 30C. Mean oxygen consumption rate was positively linearly correlated with increasing temperatures (15-35C). Van't Hoff temperature coefficients ranged from 3.56-1.44 at 15-30C, showing a lack of adaptation to the increasing temperatures. Mean carbon dioxide production was high and was positively linearly correlated with temperature to 30C. Reduction of the ingestion rate above 30C was significant. Mean assimilation rates were positively linearly correlated with temperatures to 25C. Reduction in the assimilation rates above 25C was significant.
W75-02893

KINETICS OF PHOSPHATE ADSORPTION AND DESORPTION BY LAKE SEDIMENTS,
Maine Univ., Orono. Dept. of Plant and Soil Sciences.
S. Kuo, and E. G. Lotse.
Proceedings of Soil Science Society of America, Vol 38, No 1, p 50-54, 1974. 8 fig, 34 ref. OWRR A-016-ME(2).

Descriptors: *Phosphates, *Adsorption, *Lakes, *Sediments, *Maine, Kinetics, Anions, Mathematical studies, Chelation, Isotherms, Cycling nutrients, *Lake sediments.
Identifiers: *Sebasticook Lake(Me), Phosphorus desorption.

Rate and extent of phosphate adsorption and desorption and the energy of phosphorus adsorption by lake sediments was studied and influence of the sediments on the P status of lake waters evaluated. Sediment samples were collected from sites in Sebasticook Lake near Newport, Maine. Physical and chemical properties of the sediment samples are given and phosphorus adsorption is illustrated. Release of phosphorus from untreated sediments by various anions is shown. While phosphate adsorption could be described by the Freundlich equation over a large phosphorus concentration range, the Langmuir equation provided a good fit only at low P concentrations. Deviation from the Langmuir isotherm at high phosphorus concentrations is explained by increase in total negative potential of the surface due to P adsorption and increased interaction between adsorbate molecules. Rate of phosphorus adsorption could be described by an equation. The desorption of phosphorus from minerals and sediments was dependent on the anionic species. The replacing power of the anions appeared related to their ionic potential and complexing ability. Rate of phosphorus desorption could be described by the proposed kinetic equation. (Jones-Wisconsin)
W75-02904

CHEMICAL AND PHYSICAL CHARACTERISTICS OF A EUTROPHIC RESERVOIR AND ITS TRIBUTARIES: LONG LAKE, WASHINGTON,
Eastern Washington State Coll., Cheney. Dept. of Biology.
R. A. Soltero, A. F. Gasperino, and W. G. Graham.
Water Research, Vol 8, No 7, p 419-431, 1974. 8 fig, 4 tab, 23 ref. OWRT A-058-WASH(2).

Descriptors: *Chemical properties, *Physical properties, *Eutrophication, *Reservoirs, Tributaries, *Washington, Nutrients, Ions, Water quality, Hypolimnion, Anaerobic conditions, Stratification, Withdrawal, Conductivity, Phosphates, Nitrates, Water pollution sources, Sewage effluents.
Identifiers: *Long Lake(Wash).

Long Lake, Washington was studied to determine nutrient levels, source and cause of nutrient input, to prepare a nutrient budget by determining the inflow-outflow and storage of each nutrient and a salinity budget by determining the inflow-outflow and storage of major ions, and to interpret the effect of the practice of deep-water withdrawal from Long Lake Dam. Five sampling stations were established on the reservoir, six on the Spokane River and its major tributaries. The Spokane River was sampled upstream and downstream from the sewage treatment plant. A major source of nutrients was the effluents from the Spokane primary sewage treatment plant via the Spokane River. Existing concentrations of nitrate nitrogen and orthophosphate increased threefold and tenfold, respectively, below the effluent. Of the influent phosphate phosphorus, 19% was retained in the reservoir. A density current system was evident in Long Lake which altered vertical and longitudinal distribution of physical and chemical parameters. This current isolated a wedge of water on the reservoir bottom which became anaerobic. During the period of anaerobiosis, phosphate phosphorus and nitrogen maxima were present in the hypolimnion. (Jones-Wisconsin)
W75-02905

THE EFFECTS OF DDT, WHEN USED AS A MOSQUITO LARVICIDE, ON TADPOLES OF THE FROG RANA TEMPORARIA,
Nature Conservancy, Abbots Ripton (England). Monks Wood Experiment Station.
A. S. Cooke.
Environ Pollut, Vol 5, No 4, p 259-273, 1973.
Identifiers: *DDT, Fish, *Frogs(Tadpoles), Larvicides, Mosquitos, Rana-temporaria, Snails, *United Kingdom(England), Larvae, *Water pollution effects.

Several water bodies on the Isle of Grain in Northe Kent (England, United Kingdom) sprayed annually with DDT by the local health department to control mosquito larvae. In 1971 the effects of this treatment on caged tadpoles (R. temporaria) were assessed. Two nylon mesh cages were staked in each of 5 different water bodies varying in size from a ditch 1 m wide to a gravel pit 140 x 30 m. Tadpoles were placed in the cages 4 or 5 days before spraying. In the vicinity of the cages, the margins of each site were sprayed with 0.4-0.5 kg DDT/ha. Observations were made and tadpole samples were taken for analysis 1, 3 and 14 days after spraying. Death, morphological abnormality or hyperactivity occurred only among tadpoles in the 3 smallest sites. Tadpoles in most of the cages were exposed to DDT for many days after spraying. In a site where tadpoles were exposed to high acute levels, larval development was significantly retarded; in the largest site, where tadpoles acquired tissue residues more slowly, their rate of metamorphosis was increased. These observations were consistent with those made during acute and chronic dosing experiments in the laboratory and further similarities between field and laboratory studies are discussed. The effects of this use of DDT on tadpole populations is briefly considered. Residues in free-living snails and fish were also determined.--Copyright 1974, Biological Abstracts, Inc.
W75-02906

EFFECTS OF COLD SHOCK ON VULNERABILITY OF JUVENILE CHANNEL CATFISH (ICTALURUS PUNCTATUS) AND LARGEMOUTH BASS (MICROPTERUS SALMOIDES) TO PREDATION,
Oak Ridge National Lab., Tenn.
C. C. Coutant, H. M. Ducharme, Jr., and J. R. Fisher.
Journal of the Fisheries Research Board of Canada, Vol 31, No 3, p 351-354, March 1974. 1 fig, 1 tab, 12 ref.

Descriptors: *Channel catfish, *Bass, Stress, *Juvenile fish, *Predation, Catfishes, Freshwater fish, *Thermal stress, Thermal pollution, Water pollution effects, Methodology, Water poilution effects.
Identifiers: *Cold shock, Sublethal effects, Cold stress.

Acute cold stress caused increased predation on juvenile channel catfish and largemouth bass by unstressed adult largemouth bass when temperature differentials were 9 and 7 C or more, respectively (base differential temperatures 16 and 17 C). Predation rate tended to increase exponentially with increasing temperature differential. Catfish held 1 hour in the cold water were only slightly less susceptible to predation than were others tested immediately after the temperature change. (Katz)
W75-02915

MERCURY IN SOME CANADIAN ATLANTIC COAST FISH AND SHELLFISH,
Fisheries Research Board of Canada, Halifax (Nova Scotia). Halifax Lab.
For primary bibliographic entry see Field 5A.
W75-02916

EFFECTS OF REDUCED OXYGEN ON THE EMBRYOS AND LARVAE OF LAKE TROUT (SALVELINUS NAMAYCUSH) AND LARGEMOUTH BASS (MICROPTERUS SALMOIDES),
National Water Quality Lab., Duluth, Minn.
A. R. Carlson, and R. E. Siefert.
Journal of the Fisheries Research Board of Canada, Vol 31, No 8, p 1393-1396, 1974. 2 tab, 11 ref.

Descriptors: *Oxygen, *Bass, *Lake trout, *Dissolved oxygen, *Larvae, Immature growth stage, Larval growth stage, Temperature, Growth rates, Hatching, Saturation, Laboratory tests, Methodology, Water pollution effects.

At 7 and 10 C lake trout development from fertilization through first feeding was inhibited at all reduced oxygen saturations tested (50% and lower). Survival was adversely affected at all reduced concentrations although only slightly at 50% saturation at 7 C. At 20 to 23 C, oxygen concentrations as low as 35% saturation were adequate for largemouth bass survival. However, even at the highest reduced oxygen saturation, (70%) growth was reduced, and at saturations of 50% and below, hatching was premature and first feeding was delayed. (Katz)
W75-02917

SENSITIVITY OF RESTRAINED SKIPJACK TUNA (KATSUWONUS PELAMIS) TO ABRUPT INCREASES IN TEMPERATURE,
National Marine Fisheries Service, Honolulu, Hawaii. Southwest Fisheries Center.
A. E. Dizon, E. D. Stevens, W. H. Neill, and J. J. Magnuson.
Comparative Biochemistry and Physiology, Vol 49A, p 291-299, 1974. 2 fig, 1 tab, 12 ref.

Descriptors: *Commercial fish, *Thermocline, *Fish behavior, Temperature, Thermal properties, Methodology, Water pollution effects, *Thermal pollution.
Identifiers: *Skipjack tuna, *Temperature sensitivity, Heart rate, Pelagic fish.

Restrained skipjack tuna signaled by deceleration of heart rate that they could perceive abrupt temperature increases (1C/sec) as small as 1C. A thermal stimulus directed into the oral-branchial cavity was more effective in eliciting responses than stimuli delivered to the nasal cavity or the dorsal, anterior quadrant of the body surface. The finding is discussed in relation to the current belief that thermal sensors in fish are generously scattered over the skin surface. (Katz)
W75-02919

CHEMICAL COMPOSITION OF EFFLUENT FROM HIGH DENSITY CULTURE OF CHANNEL CATFISH,
Georgia Univ., Savannah. Agricultural Experiment Station.
For primary bibliographic entry see Field 5B.
W75-02920

THE INFLUENCE OF 'RED SLUDGE' ON GREEN ALGAE POPULATIONS (UBER DEN EINFLUSS VON ROTSCHLAMM AUF DIE BESIEDLUNGSOICHTE VON GRUNALGEN),
Bundesforschungsanstalt fuer Fischerei, Hamburg (West Germany). Institut fuer Kuesten- und Binnenfischerei.
V. Dethlefsen.
Archiv fur Fischereiwissenschaft, Vol 23, No 1, p 68-72, June 1972. 3 fig, 6 ref. English abstract.

Descriptors: *Algae, *Toxicity, *Industrial wastes, Water pollution sources, Methodology, Aluminum, Photometry, Analytical techniques, *Chlorophyta, Water pollution effects.
Identifiers: *Red sludge.

The influence of 'red sludge' on the density of green algae populations (Monadina) was tested. The algae concentrations were measured by a photometer. All concentrations of 'red sludge', 0.5 - 50 g/l, harmed the green algae. (Katz)
W75-02921

GAS-BUBBLE DISEASE IN THE BROWN SHRIMP (PENAEUS AZTECUS),
National Marine Fisheries Service, Galveston, Tex. Gulf Coastal Fisheries Center.
D. V. Lightner, B. R. Salser, and R. S. Wheeler.
Aquaculture, Vol 4, No 1, p 81-84, September 1974. 2 fig, 7 ref.

Descriptors: *Shrimp, *Commercial shellfish, *Heated water, *Supersaturation, Laboratory tests, Gases, Invertebrates, Nitrogen, Immature growth stage, Bioassay, Microscopy, Shellfish farming, Aquaculture, Water pollution effects, *Fish diseases.
Identifiers: *Gas bubble disease, Penaeus aztecus, Shrimp culture, *Brown shrimp.

Gas-bubble disease in larval and juvenile brown shrimp (Penaeus aztecus) is described. Stage II protozoeal, larval brown shrimp developed the disease after being placed in water warmed in a closed heater that did not allow excess gas to escape. Juvenile brown shrimp developed gas-bubble disease after being held in a pressure tank for 35 h. The pressure in the tank had been maintained at 2,585 mm Hg with compressed air. The implications of the finding that shrimp are susceptible to gas-bubble disease are discussed in relation to shrimp culture activities, particularly those that use heated water. (Katz)
W75-02922

NOTE ON THE CONTAMINATION OF LIVING SYSTEMS BY CHLORINATED BIPHENYLS (NOTE SUR LA CONTAMINATION DU MILIEU VIVANT PAR LES BIPHENYLES CHLORES),
Centre Technique du Genie Rural des Eaux et des Forets, Paris (France). Laboratoire des Micropolluants.
R. Belamie.
Bulletin Francais de Pisciculture, Vol 253, No 2, p 150-153, June, 1974. 7 ref.

Descriptors: *Polychlorinated biphenyls, Environmental effects, Water pollution effects, Reproduction absorption, Plastics, Pesticides, Data collections, *Chlorinated hydrocarbon pesticides, Lethal limit.
Identifiers: *Chlorinated triphenyls, *Sublethal effects, Bioconcentration.

The study of the mechanisms of the release of chlorinated biphenyls and triphenyls from materials in which they are incorporated permits the determination of their role in the contamination of living systems. It appears to be necessary to define sublethal effects of these substances on aquatic organisms: selective concentration in tissues, metabolic effects, and effects on reproduction. (Katz)
W75-02924

EFFECTS OF THE HERBICIDE PARAQUAT ON THE ECOLOGY OF A RESERVOIR, III. FAUNA AND GENERAL DISCUSSION,
University of Wales Inst. of Science and Tech., Cardiff. Dept. of Applied Biology.
M. P. Brooker, and R. W. Edwards.
Freshwater Biology, Vol 4, No 4, p 311-335, August 1974. 10 fig, 3 tab, 43 ref.

Descriptors: *Paraquat, *Herbicides, *Water pollution effects, *Plankton, Environmental effects, Pesticides, Water pollution sources, Algae, Invertebrates, Benthos, Eels, Reservoirs, *Toxicity, Laboratory tests, Lethal limit, On-site investigations, Ecology, Biological communities, Trout, Primary productivity.
Identifiers: Cypridopsis vidua, *Paraquat.

Toxicity experiments indicated that changes in the fauna following the use of paraquat for weed control were likely to be indirect effects caused by the death and destruction of angiosperms. Invertebrates living amongst the emergent vegetation in the margins of the reservoir were unaffected though the density of the benthic ostracod Cypridopsis vidua increased after the death of angiosperms. Planktonic invertebrates which were closely associated with the macrophytes were eliminated or survived at lower densities. Many invertebrates intimately associated with the angiosperms were lost completely or colonized the replacement growth of Chara globularis at reduced densities. A few species colonizing Chara were able to establish densities comparable with those found on the angiosperms in the pre-herbicide period but in some cases the time of peak density was delayed. Data from fish gut analyses indicated that there was a change in the diet of the eel following the death of the angiosperms and that this was largely a reflection of the loss, or reduction in density, or many invertebrates associated with the angiosperms. (Katz)
W75-02925

VERTICAL DISTRIBUTION OF THE BACTERIOPLANKTON AND THE THERMAL-OXYGEN RELATIONS IN THE WATER OF THE ILAWA LAKES,
Akademia Rolniczo-Techniczno, Olsztyn-Kortow (Poland). Instytut Inzynierii i Biotechnologii Zywnosci.
S. Niewolak.
Acta Hydrobiologica, Vol 16, No 2, p 173-187, 1974. 4 fig, 3 tab, 36 ref.

Descriptors: *Dissolved oxygen, *Bacteria, *Aquatic bacteria, *Distribution patterns, Hypolimnion, Stratification, Seasonal, Plankton, Temperature, Gases, Oxygen sag, Water pollution effects, Water pollution sources.
Identifiers: Vertical distribution, *Bacterioplankton, Rod bacteria, *Poland(Ilawa lakes).

Annual thermal-oxygen relations and the vertical distribution of bacterioplankton in Lake Jeziorak Maly and Lake Jeziorak (Mazurian Lake District) are considered. In the shallow stations of the investigated lakes, bacterioplankton occur in greater numbers near the bottom in summer and near the surface in winter; in deeper stations the number of these microorganisms often decreases with depth and increases at the bottom. In both investigated lakes the dominant form of bacterioplankton are the rod-bacteria, in spring cocci appear in greater numbers. Other morphological forms of the bacterioplankton appeared in smaller numbers. The highest oxygen consumption occurs in summer and reaches a level of about 0.3 mg O2/1/24 hours, especially in the bottom water of these lakes. (Katz)
W75-02926

RHEOTACTIC BEHAVIOR OF SOME GAMMARUS SPECIES IN DIFFERENT OXYGEN CONCENTRATIONS OF THE WATER (RHEOTAKTISCHES VERHALTEN EINIGER GAMMARUS ARTEN BEI VERSHIEDENEM SAUERSTOFFGEHALT DES WASSERS),
Baden-Wuerttemberg Landesstelle fuer Gewaesserkunde und Wasserwirtschaftliche Planung, Karlsruhe (West Germany).
H. Vobis.
Helgolander wissenschaftiche Meeresunters, Vol 25, No 4, p 495-508, December 1973. 5 fig, 33 ref. English abstract.

Descriptors: *Animal behavior, *Invertebrates, *Aquatic animals, *Dissolved oxygen, *Laboratory tests, Currents(Water), *Rheotropism, Analytical techniques, Water pollution effects.
Identifiers: *Gammarus ssp.

An experimental vessel has been developed which makes it possible to observe the behavior of gammarids and other aquatic invertebrates in various water current speeds and oxygen concentrations. In adequate oxygen concentrations, the gammarids tested showed a moderate positive rheotaxis. Lethal and sublethal oxygen concentrations, however, lead to negative rheotaxis. The maximum degree of upstream movement is attained in the region of critical oxygen concentration. Under the experimental conditions (15C, water current 5 cm/sec), these maxima vary according to species. The maximum occurred at 2.7 mg O2/l for Gammarus pulex, 3.1 mg O2/l for G. roesli, 3.5 mg O2/l for G. tigrinus, and 5.3 mg O2/l for G. fossarum. No such maximum was found for G. salinus. Oxygen deficit causes G. salinus to move downstream at 2.5 mg O2/l. (Katz)
W75-02927

INFLUENCE OF DISSOLVED ATMOSPHERIC GAS ON SWIMMING PERFORMANCE OF JUVENILE CHINOOK SALMON,
National Marine Fisheries Service, Seattle, Wash. Northwest Fisheries Center.
M. H. Schiewe.
Transactions of the American Fisheries Society, Vol 103, No 4, p 717-721, 1974. 1 fig, 1 tab, 14 ref.

Descriptors: *Fish behavior, *Nitrogen, *Dissolved oxygen, Gases, Supersaturation, Juvenile fish, *Bioassay, *Chinook salmon, Lethal limit, Water pollution effects.
Identifiers: Dissolved atmospheric gas, Swimming performance(Fish), Oncorhyncus tshawutscha, Sublethal effects, Gas bubble disease.

Juvenile chinook salmon, Oncorhyncus tsawytscha, were exposed to selected levels of dissolved atmospheric gas ranging from 100 (control) to 120% of saturation, and surviving fish were then tested for maximal swimming performance. Decreased swimming capability resulted from exposure to concentrations ranging from 106 to 120% of saturation if the fish were tested immediately; other tests indicated that recovery of swimming capabilities occurred within 2 hr if the fish were returned to equilibrated water (100% of atmospheric saturation) before testing. (Katz)
W75-02928

CHRONIC TOXICITY OF HYDROGEN SULFIDE TO GAMMARUS PSEUDOLIMNAEUS,
Minnesota Univ., St. Paul. Dept. of Entomology, Fisheries and Wildlife.
D. M. Oseid, and L. L. Smith, Jr.
Transactions of the American Fisheries Society, Vol 103, No 4, p 819-822, 1974. 1 fig, 3 tab, 9 ref.

Descriptors: *Decomposing organic matter, *Lethal limit, *Hydrogen sulphide, *Toxicity, Toxicants, Sulfur compounds, Reproduction, Degradation(Decomposition), Water pollution sources, Lethal limit, Water pollution effects, Minnesota.
Identifiers: *Gammarus pseudolimnaeus, Sublethal effects, LC50.

Gammarus pseudolimnaeus from two trout streams were exposed to various levels of hydrogen sulfide from 0.0007 to 0.0192 mg/liter in a flow-through apparatus for periods of 65, 95, and 105 days in four tests. Results indicate that 0.002 mg/liter of H2S is the maximum safe concentration for Gammarus, but below this level there is increased reproduction or survival. Mean 96-hr LC50 for Gammarus from the same populations was 0.022 mg/liter of H2S or approximately 10 times the safe level. (Katz)
W75-02929

TOXICITY OF MERCURY AND SELENIUM TO THE EGGS OF CARP (CYPRINUS CARPIO),
Oak Ridge National Lab., Tenn.
J. W. Huckabee, and N. A. Griffith.
Transactions of the American Fisheries Society, Vol 103, No 4, p 822-825, 1974. 1 tab, 21 ref.

Descriptors: *Toxicity, *Mercury, *Bioassay, Heavy metals, Water pollution effects, Methodology, Lethal limit, Laboratory tests, *Carp, *Fish eggs.
Identifiers: *Selenium, Hatchability, Synergistic effects.

Antagonistic interactions of mercury and selenium have been demonstrated in vivo, but interactions under environmental conditions that might affect the toxicity of either element have not. Carp eggs

were exposed to trace amounts of mercury and selenium to test for an effect on hatchability. Test concentrations of Hg (II) (from HgCl2) and SeO3(2-) (from SeO2) were 1,2,3,4, and 5 micro g/g each, and each possible combination of these concentrations. No eggs hatched when incubated in greater than or equal to 4 micro g/g Hg (II), but up to 5 micro g/g SeO3(2-) had no effect on hatchability. (Katz)
W75-02930

THE RELATION OF IRRIGATION RETURN-FLOWS TO WATER CHEMISTRY AND PERIPHYTON IN THE LEMHI RIVER, IDAHO,
Idaho Univ., Moscow. Coll. of Forestry, Wildlife and Range Sciences.
For primary bibliographic entry see Field 5B.
W75-02980

THE RESPONSE OF BLUEGILLS (LEPOMIS MACROCHINIS RAFINESQUE) IN A POLLUTION MONITORING SYSTEM TO A DIURNAL TEMPERATURE CHANGE,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology; and Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.
J. Cairns, Jr., E. L. Morgan, and R. E. Sparks.
Transactions of the American Fisheries Society, Vol 103, No 2, p 138-140, January 1974. 2 fig, 4 ref. OWRT A-039-VA(5).

Descriptors: *Sunfishes, *Thermoperiodism, *Fish behavior, Biorhythums, Aquatic life, Diurnal, Water pollution effects, Industrial pollution, Thermal pollution, Monitoring, Seasonal.
Identifiers: *Diurnal temperature cycle, Pollution monitoring system, *Potomac River.

The breathing and swimming activity rates of four bluegills in a laboratory version of a pollution monitoring apparatus increased when the diurnal temperature cycle changed from a control cycle of 24.8-26.0C to a treatment cycle of 24.8-29.2C. The latter simulated the temperature regime for the Potomac River in June 1961, at a location free of extraneous thermal effluents. If a blue gill response is being used to detect industrial pollution, critical response values must be determined so that a diurnal temperature change does not cause a false warning signal. The results of this investigation suggest that this can be accomplished. (Katz)
W75-02987

TEMPERATURE-TIME RELATIONSHIPS FOR SURVIVAL OF EMBRYOS AND LARVAE OF MULINIA LATERALIS (MOLLUSCA: BIVALVIA),
Maryland Univ., Solomons. Natural Resources Inst.
V. S. Kennedy, W. H. Roosenberg, H. H. Zion, and M. Castagna.
Marine Biology, Vol 24, No 2, p 137-145, 1974. 6 fig, 5 tab, 28 ref.

Descriptors: *Mollusks, *Thermal pollution, *Clams, Water pollution effects, Mortality, Water pollution sources, Cooling water, Mathematical model, Analytical techniques, Larvae, Embryonic growth stage, Methodology, Electric power plants, Fishkill.
Identifiers: *Mulinia ssp., *Temperature tolerance, Thermal gradient, Trochophore larvae, Straight-hinge larvae, Multiple regression equations.

The influence of temperature over 8 time intervals on survival of cleavage stages, trochophore larvae, and straight-hinge veliger larvae of Mulinia lateralis (Say) was investigated using a thermal gradient apparatus. Eleven temperatures, ranging from 19C to 44C were used. There was a direct relationship of mortality with increased temperature and, at higher temperatures, with increased period of exposure. Temperature tolerance increased as the clams aged, with cleavage stages being most sensitive to higher temperatures and straight-hinge larvae least sensitive. Multiple regression equations were developed to allow prediction of percentage mortality under different conditions of temperature and time exposure. Entrainment of M. lateralis embryos and larvae in the cooling water systems of steam-electric power plants should be as short as possible to keep mortality to a minimum. (Katz)
W75-02988

STREAM DRIFT AS AN INDICATION OF WATER QUALITY,
Illinois State Natural History Survey, Urbana.
For primary bibliographic entry see Field 5B.
W75-02989

CONTROL OF ALGAE AT VANTAA RIVER BASIN,
Helsinki City Waterworks (Finland). Water Examination Bureau.
H. Harjula, and A. Langi.
Aqua Fennica, p 69-81, 1973. 6 fig, 2 tab, 36 ref.

Descriptors: *Odor-producing algae, *Copper sulfate, *Pesticides, *Algae control, *Algicides, Cyanophyta, Water quality, Eutrophication, Water pollution sources, Organoleptic properties, Sampling, Water quality control.
Identifiers: *Finland(Helsinki), Threshold Odor Numbers.

The prevention of algae blooms is discussed, from the approach of maintaining untainted potable water in Helsinki. Copper sulfate is an economical and selectively toxic algicide and is used with success in Helsinki. Treatment of the water supply is discussed in detail. (Katz)
W75-02990

COMPARATIVE PHYSIOLOGY AND MORPHOLOGY OF SIX STRAINS OF STIGONEMATACEAN BLUE-GREEN ALGAE,
East Tennessee State Univ., Johnson City. Dept. of Biology.
T. C. Martin, and J. T. Wyatt.
Journal of Phycology, Vol 10, No 1, p 57-65, 1974. 10 fig, 3 tab, 31 ref. OWRT A-029-TENN(1).

Descriptors: *Algae, *Plant physiology, *Plant morphology, *Cyanophyta, Systematics, Cytological studies.
Identifiers: *Stigonemataceae.

Six strains of Stigonematacean blue-green algae were examined for clues to explain their apparent noncompetitiveness. Classical taxonomic treatments were often inadequate for confident species determination; forms that were very different morphologically frequently 'keyed' to the same species. Strain distinctions based on comparative morphological and physiological studies were inconclusive. With the exception of one species, there were no substantial differences in physiological rates. The most extensively examined characteristic has been their capacity for nitrogen fixation. The dearth of information may be partly due to their scarcity in nature. In addition to the branching habit, diversity of cellular form was an outstanding group characteristic. Individual cells of developing trichomes became spore-like and then divided to produce either cell clusters or lateral branches. The eventual separation of daughter cells by sheath materials may be analogous to spore formation in Nostocales and could be the factor which determines the nature of these organisms. Their very dense colonial habit is, in itself, light limiting and nutrient restrictive. Sheath retention of spores (or spore-like cells) and the lack of hormogone structures which restrict dispersal in some forms also indicate a primitive rather than an advanced condition. (Jones-Wisconsin)
W75-03006

EFFECTS OF CONSTANT AND RISING TEMPERATURES ON DEVELOPMENT AND SURVIVAL OF EMBRYOS AND LARVAE OF YELLOW PERCH,
Environmental Protection Agency, Monticello, Minn.
K. E. F. Hokanson, and C. F. Kleiner.
In: The Early Life History of Fish, J. H. S. Blaxter, editor Springer-Verlag, Berlin, Heidelberg, New York, p 437-448, 1974. 5 fig, 2 tab, 16 ref.

Descriptors: *Yellow perch, *Water temperature, *Embryonic growth stage, *Larvae, Fish eggs, Fry, Environmental effects, Thermal pollution, Bioassay, Resistance, Water pollution effects.
Identifiers: Developmental rates, Tolerance limits, Survival, Constant temperature, Rising temperature.

The survival and duration of development of yellow perch (Perca flavescens (Mitchill)) embryos and larvae were studied in continuous-flow incubators at constant temperatures ranging from 3.0 to 25.5C. Eggs were tempered to test conditions either soon after fertilization, or after the neural keel had been formed in embryos held at 12.0C. A portion of the embryos, reared initially at 5, 7 and 10C, were exposed to rising temperatures at an average rate of increase of 0.5 or 1.0C/day. At constant incubation temperatures, the lower and upper median tolerance limits (TL50) were 6.8 and 19.9C for normal hatch, and 9.8 and 18.8C for yield of free-swimming larvae. The optimum range was quite narrow (13.0-16.1C). The TL50 limits for embryos tempered to temperature extremes after formation of the neural keel were 7.0 and 22.9C for normal hatch, and 9.3 and 22.5C for yield of free-swimming larvae. Under rising temperature regimes the yield of free-swimming larvae was highest while the incidence of abnormalties and duration of the hatching period were lowest. The average time to mass hatch ranged from 6 days at 19.7C to 51 days at 5.4C. Hatching was precocious at 5.4 and 3.1C. The larvae became free-swimming within two days after mass hatch above 7.3C. Median survival time of unfed larvae ranged from 15 days at 19.8C to 65 days at 5.3C. (EPA)
W75-03019

ASSESSING EFFECTS ON WATER QUALITY BY BOATING ACTIVITY,
Florida Technological Univ., Orlando, Fla. Coll. of Engineering.
Y. A. Yousef.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-237 519, $4.25 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Technology Series, Report EPA/2-74-072, October 1974. 59 p, 15 fig, 27 tab, 22 ref. EPA 1BB038. 68-03-0290.

Descriptors: *Lakes, Boats, Mixing, *Turbulence, Limnology, *Water analysis, Nutrients, *Boating, *Florida, Water quality, Destratification, Water pollution effects, Shallow water, Turbidity.
Identifiers: Winter Park(Fla), Chain of lakes, Shallow lakes.

This research study was directed towards an assessment of effects on water quality in shallow water bodies (less than 30 feet deep) due to mixing by boating activity. Definition of the problem, isolation of effects and conditions and determination of areas for further research were stressed. Four shallow lakes in Orange County, Florida, namely Lake Mizell, Lake Osceola, Lake Maitland, and Lake Claire were studied. Changes in several water quality parameters before and after limited boating activity were monitored. Agitation and mixing by boating activity destratified the lake and in some cases, increased oxygen concentration and the rate of oxygen uptake by suspended matter. An increase in turbidity was observed and was generally dependent on water depth, motor power, and nature of bottom deposits. Increase in turbidity was accompanied by an increase in or-

ganic carbon and phosphorus concentration. A decrease in turbidity was also noticed after cessation of boating activity. Results from other parameters such as pH, specific conductance, temperature, and nitrogen were not conclusive. (EPA)
W75-03020

BIOLOGICAL EFFECTS IN THE HYDROLOGICAL CYCLE,
For primary bibliographic entry see Field 2A.
W75-03023

HYDROLOGIC SIMULATION AND THE ECOLOGICAL SYSTEM,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 2A.
W75-03026

NUTRIENT INPUTS AND THEIR RELATIONSHIP TO ACCELERATED EUTROPHICATION IN LAKE MICHIGAN,
Michigan Univ., Ann Arbor. Great Lakes Research Div.
C. L. Schelske.
In: Biological Effects in the Hydrological Cycle, Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana. p 59-81. 6 fig, 4 tab, 35 ref.

Descriptors: *Eutrophication, *Water quality, *Lake Michigan, *Phosphorous, *Nutrients, Tropic level, Water properties, Water pollution effects, Surface waters, Great Lakes, Productivity, Oligotrophy, Plankton, Oxygen, Nutrient requirements, Primary productivity, Phosphorus compounds, Silica, Phytoplankton, Diatoms.
Identifiers: *Limiting nutrients, Secchi disc transparency.

Data were presented to demonstrate the need for phosphorus control in Lake Michigan. The studies showed that: (1) silica depletion will become an increasingly serious problem; (2) phosphorus pollution has caused an increased demand by diatoms for available supplies of silica in the lake; (3) both of these factors, and probably others, have contributed to accelerated eutrophication of the lake; (4) due to accelerated eutrophication, phytoplankton assemblages will change from those dominated by diatoms to those with increasing proportions of green and blue-green algae; and (5) due to the large volume and long residence time of water in the lake, there will be a considerable time lag before current management practices could possibly have a large effect on the inputs of phosphorus and the imbalance between phosphorus and silica. (See also W75-03023) (Henley-ISWS)
W75-03029

RESEARCH AND DEVELOPMENT OF A SELECTIVE ALGAECIDE TO CONTROL NUISANCE ALGAL GROWTH,
Dow Chemical Co., Freeport, Tex.
B. L. Prows, and W. F. McIlhenny.
Copy Available from GPO Sup Doc as EP1.23:660/3-74-019, $2.95; microfiche from NTIS Springfield, Va 22161 as PB-238 487; $2.25. USEPA, Office of Research and Development, Environmental Protection Agency, Ecological Research Series, Report EPA 660/3-74-019, August 1974. 221 p, 14 fig, 44 tab, 44 ref, 5 append. Program Element 1BA031. EPA Contract No 68-01-0782.

Descriptors: *Algicides, *Nuisance algae, *Biocontrol, *Toxicity, Environmental control, Organic compounds, Cyanophyta, Laboratory tests, Water pollution control, *On-site tests, Water pollution effects, North Carolina, Minnesota, Oregon, Chemcontrol.
Identifiers: Chowan River(NC), Lake Sallie(MN), Diamond Lake(OR), *Algal control, Algal growth, Phagocytic organisms, Ochromonas ovalis.

The primary objective of this project was to determine under natural, open-field conditions, the efficacy of two candidate algaecides, Compound No. 23 (2,5-Dichloro-3,4-dinitrothiophene) and No. 73 (p-Chlorophenyl-2-thienyl iodonium chloride) from Phase II of the multiple phase developmental program. Specific efforts were also directed toward further delineation of the toxicological and environmental persistence properties of the candidate compounds, as well as further development of a possible biological-chemical control system. Data from the field tests conducted under a wide variety of conditions in four geographically diverse regions of the United States revealed a distinctive pattern of selective blue-green algal control for both experimental compounds. Compound No. 23 was eliminated from the test series due to unacceptable fish toxicity. A whole-pond field study involving the use of a phagocytic organism, Ochromonas ovalis, as a biological control system, was inconclusive due to the apparent inability of the organism to survive under the existing environmental conditions. Continued laboratory screening tests of some 70 additional compounds produced two additional candidate compounds, No. 136 (2,2'-(1,2-Ethenediyl)bisbenzoxazole) and No. 176 (1,2-Dichloro-4-(isothiocyanatomethoxy) benzene). Continuation of testing of candidate compounds under field conditions is recommended. (EPA)
W75-03046

INTERACTIONS OF TRACE METALS IN RAT TISSUES, CADMIUM AND NICKEL WITH ZINC, CHROMIUM, COPPER, MANGANESE,
Dartmouth Coll., Hanover, N.H. Dept. of Physiology.
H. A. Schroeder, and A. P. Nason.
The Journal of Nutrition, Vol 104, No 2, p 167-178, February, 1974. 4 tab, 34 ref. PHS (ES 00699-13A1).

Descriptors: *Trace elements, *Rodents, *Animal physiology, *Cadmium, *Nickel, Zinc, Chromium, Copper, Manganese, Laboratory tests, Testing procedures, Laboratory animals, Analytical techniques, Spectroscopy, Cobalt, *Metals, Water pollution effects.

In order to ascertain what effect one essential trace metal might have on tissue concentration of another, rats were born and raised in an environment controlled as to contaminating trace metals until natural death. One group of 60 was given plain deionized water for a year and then killed. Two groups of 100 or more equally divided as to sex were given a basal water containing added zinc (50 ppm), manganese (10 ppm), chromium (5 ppm), copper (5 ppm), cobalt (1 ppm) and molybdenum (1 ppm) as soluble salts, or this basal water without chromium. Two other groups were given cadmium (50 ppm) or nickel (5 ppm) in the chromium-containing basal water. Five organs from each rat were ashed and analyzed for zinc, copper, manganese, chromium and cadmium by atomic absorption spectrophotometry. Conclusions were: (1) zinc at a level of 22 micrograms/g diet and copper at 1.4 micrograms/g diet were adequate for growth but inadequate for filling all binding sites and stores; (2) manganese at 13 micrograms/g diet may be insufficient for repletion of splenic manganese stores, (3) chromium at 0.07 micrograms/g diet does not cause cadmium accumulation with age and is thus in balance. (Jernigan-Vanderbilt)
W75-03055

EFFECT OF INCORPORATION OF LEAD ON SOLUBILITY OF THE BONE MINERAL,
G. M. Coll., Sambalpur (India). Dept. of Chemistry,
N. S. Chickerur, and S. V. Chiranjeevi Rao.
Current Science, Vol 42, No 14, p 503, July, 1973. 7 ref.

Descriptors: *Lead, *Inorganic compounds, *Water pollution effects, Solubility, Saturation, Laboratory tests, Testing procedures, Calcium, Heavy metals, *Chemical precipitation.
Identifiers: Co-precipitation, *Bone mineral, *Calcium hydroxylapatite.

Calcium hydroxylapatite, (CaHA), Ca10 (PO4)6(OH)2 is the major crystalline inorganic component of the bone mineral. Ca(2+) in it can be replaced by Pb(2+) resulting in the formation of solid solutions of calcium-lead hydroxylapatites. Samples of CaHA of varying contents of lead were obtained in the form of solid solutions by co-precipitation. Chemical compositions of the samples were determined by complexometric procedures and the formation of solid solutions was confirmed by chemical analysis, X-ray, and electron microscopic studies. The solubility of the samples was determined by analyzing the phosphate content in a convenient volume of the solvent after attainment of saturation in each case. It was observed that (1) the solubility of a given sample decreased with the increase of pH of the medium of dissolution, and (2) at a given pH the solubility decreased initially and increased after/about 50 mole% of lead hydroxylapatite in the solid solutions. This observation may be explained on the basis of formation of semi-covalent bonds on introduction of lead in calcium hydroxylapatite. This explains the role of incorporated lead in the solubility behavior of the bone mineral. (Jernigan-Vanderbilt)
W75-03057

EFFECT OF COPPER STATUS ON THE URINARY EXCRETION OF TRYPTOPHAN METABOLITES AND AMINO ACIDS BY THE RAT,
Agricultural Research Service, Ithaca, N. Y. Plant, Soil and Nutrition Lab.
L. F. Gray, and L. J. Daniel.
Journal of Nutrition, Vol 103, No 12, p 1764-1771, December, 1973. 1 fig, 4 tab, 53 ref.

Descriptors: *Copper, *Amino acids, *Rodents, *Diets, Laboratory animals, Enzymes, Vitamins, Analytical techniques, Animal metabolism, Nutrient requirements, Urine.

The effect of dietary copper on selected metabolic systems requiring pyridoxal phosphate was investigated by comparing certain urinary excretory products of pair-fed copper-deficient and copper-adequate rats. Kynurenic acid and xanthurenic acid, two tryptophan metabolites, were in lower concentrations in the urines of the copper-deficient animals in the pretryptophan-load period. Following a tryptophan load, these metabolites increased markedly in the urines of both groups, but the increments were much larger for the copper-deficient animals. The increases in kynurenic acid were greater than those of xanthurenic acid in both groups, but the increase was disproportionately higher in the copper-deficient rats. The excretion of taurine and urea by the copper-deficient rats was significantly less. At the dilution used, several amino acids were found in significant amounts in the urines of the copper-deficient animals, whereas only taurine was detected in the urines of those fed copper. Several possible explanations of these findings are discussed. (Jernigan-Vanderbilt)
W75-03061

EFFECT OF SELENITE ON THE TOXICITY OF DIETARY METHYL MERCURY AND MERCURIC CHLORIDE IN THE RAT,
North Carolina State Univ., Raleigh. Dept. of Biochemistry.
S. Potter, and G. Matrone.
Journal of Nutrition, Vol 104, No 5, p 638-647, May, 1974. 1 fig, 9 tab, 13 ref.

Descriptors: *Toxicity, *Mercury, *Public health, *Rodents, Laboratory tests, Metals, Diets, Metabolism, Growth.
Identifiers: *Selenium, Methylmercury.

Diets containing methylmercury and mercuric chloride were fed to rats with and without sodium selenite supplements. Effects of selenite-mercury interactions for both forms of mercury include enhancement of the growth rate over that observed on diets with comparable levels of mercury without selenite, altered tissue mercury levels, and altered percentage distribution of mercury among several tissues. In addition, selenite protected against mortality and neurotoxicity due to dietary methyl mercury. Possible mechanisms for the mercury-selenium interactions are discussed. (Pulliam-Vanderbilt)
W75-03062

KINETICS OF TRANSPLACENTAL MOVEMENT OF MERCURY FED IN A TUNA MATRIX TO MICE,
Oregon State Univ., Astoria. Seafoods Lab.
E. A. Childs.
Archives of Environmental Health, Vol 27, No 1, p 50-52, July, 1973. 3 fig, 1 tab, 13 ref. NOAAIS 04-3-158-4.

Descriptors: *Mercury, *Rodents, *Toxicity, *Fish, Laboratory tests, Laboratory animals, Analytical techniques, Water pollution effects, Heavy metals.

One of the toxicological properties of mercury of particular concern has been the possible effects of mercury on the developing fetus. The efficiency of mercury movement across the placental barrier appears to be a function of dose level with a larger proportion of a larger dose of mercury going to the fetal brain and a larger percentage of a smaller dose going to the maternal brain. It has been recently observed that protective agents in tuna, particularly selenium, can markedly reduce the toxicity of mercury. This study was undertaken to obtain data that would delineate the effects of meternal mercury dose level on (a) net rate of mercury uptake, (b) net mercury accumulation in the dam, (c) net mercury accumulation in the fetus and (d) ratio of net maternal mercury load to net fetal mercury load. The rate of accumulation and final net content of mercury in pregnant female mice was proportional to the level of mercury in the diet. The concentration of mercury in fetuses was also proportional to the maternal diet level. Although the fetus may contain up to twice the mother's concentration of mercury at diet levels less than or equal to 0.005 ppm, the maternal load was greater at diet levels greater than or equal to 0.05 ppm. (Jernigan-Vanderbilt)
W75-03063

TRACE METALS AND TOXICITY.
Analytical Chemistry, Vol 45, No 8, p 723-724, July, 1973. 1 tab, 2 photos.

Descriptors: *Trace elements, *Toxicity, *Lead, *Cadmium, *Public health, Human pathology, Laboratory tests, Analytical techniques, Spectroscopy, Sludge, *Metals, *Air pollution effects.

Some of the studies currently underway dealing with trace metals and toxicity are briefly discussed. J.L. Monkman of the Air Pollution Control Directorate in Ottawa reported that their laboratories may analyze up to 10,000 samples per year for lead in air, routinely received from the National Air Surveillance network, which operates some 40 high volume stations across Canada. Dr. J.F. Rosen measured the blood lead levels of 450 children, ages one to six. Results ranged from a low to normal level of 14% micrograms to a highly toxic 210% micrograms. About 20 hospitals and public health departments across the country are testing this method of blood lead determinations. In another blood level study, federal grants from HEW provided for screening children in various locations throughout the U.S. Lead and cadmium are among the trace elements determined in sewage sludges from treatment plants in Toronto and the surrounding areas. Jon Van Loon is analyzing for metals in sewage sludge since this material is used as a fertilizer and soil builder on agricultural land. (Jernigan-Vanderbilt)
W75-03064

RECOVERY OF RAINBOW TROUT FROM ALUMINUM POISONING,
Colorado State Univ., Fort Collins. Dept. of Fishery and Wildlife Biology.
R. A. Freeman.
Transactions of the American Fisheries Society, Vol 102, No 1, p 152-154, 1973. 2 fig, 2 tab, 5 ref. FWQA (WP-01398-01).

Descriptors: *Aluminum, *Toxicity, *Rainbow trout, Fish, Laboratory tests, Laboratory animals, *Bioassay, Analytical techniques, *Pollutant identification, *Water pollution effects.

As a sequel to a recent series of constant-flow bioassay studies to determine toxicity of aluminum to rainbow trout, Salmo gairdneri, trout which had been previously exposed to various concentrations of aluminum were maintained for several additional months in the absence of aluminum addition for detection of persistent effects. All fish used in the recovery study were survivors of test populations which, with one exception, had suffered at least 50% mortality during aluminum exposure. At the conclusion of the bioassays, aluminum additions were stopped and pH was allowed to return to ambient, 7.7. All fish remained in the bioassay water 8 to 11 days more before transfer to well water for recovery. Reduction of symptoms of aluminum poisoning occurred rapidly among recovering fish. Coloration and feeding returned to normal in a few days while gill hyperplasia became markedly reduced within 2 weeks. Mortality rates among the recovering groups returned to that of the control fish except for the test at pH 8.5 and 5.2 ppm aluminum. These results suggest that for the further clarification of the comprehensive effects of toxicants on aquatic life, the neglected parameters of recovery and persistent effects deserve consideration for routine inclusion in bioassay studies. (Merville-Vanderbilt)
W75-03074

CADMIUM TOXICITY IN GROWING SWINE,
Rutgers - the State Univ., New Brunswick, N.J. Dept. of Animal Sciences.
R. J. Cousins, A. K. Barbar, and J. R. Trout.
Journal of Nutrition, Vol 103, No 7, p 964-972, July, 1973. 2 fig, 6 tab, 30 ref. USPHS(ES00777-01).

Descriptors: *Bioassay, *Cadmium, *Toxicity, *Hogs, Diets, Laboratory animals, Laboratory tests, Animal physiology, Animal pathology, Phosphorus, Calcium, Protein, Growth rates, Farm wastes.

Cadmium (Cd) as cadmium chloride was added to the basal diet of 8-week-old swine at levels of 0, 50, 150, 450 and 1350 ppm for a 6-week comparison period. Growth rate was decreased as a function of Cd level, having ceased in the 1350 ppm group. Hematocrit values were the most sensitive measurement of toxicity and were decreased in all Cd-fed animals. Serum phosphorus was decreased in animals receiving 450 and 1350 ppm Cd, while serum calcium was not affected by Cd intake. Bone ash content was decreased as a function of Cd intake. Leucine aminopeptidase (LAP) activity was depresed in renal cortex from the groups receiving 150 ppm CD or more, but serum LAP was unaffected by Cd intake. The kidney, liver, spleen and teeth contained the highest concentrations of Cd. Kidney Cd increased with dietary Cd level but appeared to reach a near maximal level in the 450 and 1350 ppm Cd groups. This renal Cd content was directly related to the level of cadmium-binding protein isolated from kidney cortex by gel filtration chromatography. (Jernigan-Vanderbilt)
W75-03080

EFFECT OF ZINC DEFICIENCY IN RATS ON INSULIN RELEASE FROM THE PANCREAS,
Harvard School of Public Health, Boston, Mass. Dept. of Nutrition.
A. M. Huber, and S. N. Gershoff.
Journal of Nutrition, Vol 103, No 12, p 1739-1744, December 1973. 1 fig, 5 tab, 20 ref. PHS (86-88-177).

Descriptors: *Zinc, *Rodents, *Animal physiology, *Diets, Animal pathology, Laboratory animals, Laboratory tests, Public health, Spectroscopy, Metabolism.
Identifiers: Insulin.

To explain impaired intravenous glucose clearance in zinc-deficient rats, various parameters of insulin metabolism were measured. Three levels of dietary zinc were fed (1, 20, 1200 ppm). To help distinguish between effects caused by zinc deficiency per se and inanition which accompanies zinc deficiency, a pair-fed control group (20 ppm) was included in some studies. Feeding of high or low zinc diets did not alter the insulin content of the pancreas, but immunoreactive serum insulin and total serum insulin-like activity measured by an in vitro adipose tissue assay were significantly reduced in the zinc-deficient group compared with ad libitum controls. The pair-fed control group also showed significantly reduced circulating immunoreactive insulin but not total serum insulin-like activity. High zinc diets did not affect serum insulin levels. Short, in vitro incubation periods with glucose as a stimulant released significantly less immunoreactive insulin as well as insulin-like activity from the pancreas of zinc-deficient rats compared with control rats. The pair-fed group, however, showed a significantly decreased release of pancreatic insulin compared with ad libitum-fed controls. (Jernigan-Vanderbilt)
W75-03082

BIOAVAILABILITY OF DIFFERENT SOURCES OF DIETARY IRON FED TO PITMAN-MOORE MINIATURE PIGS,
Iowa Univ., Iowa City. Dept. of Pediatrics.
For primary bibliographic entry see Field 5B.
W75-03083

A STUDY OF NATURALLY OCCURRING ALGICIDES PRODUCED BY FRESHWATER ALGAE,
Kentucky Water Resources Inst., Lexington.
For primary bibliographic entry see Field 5G.
W75-03084

CYCLES OF MACROPHYTES AND PHYTOPLANKTON IN PUKEPUKE LAGOON FOLLOWING A SEVERE DROUGHT,
Victoria Univ., Wellington (New Zealand). Dept. of Zoology.
G. W. Gibbs.
N Z Ecol Soc Proc, 20 p 13-20, 1973 Illus.
Identifiers: Chara-globularis, Chlorophyll, Drought, Lagoons, *Macrophytes, *New Zealand(Pukepuke Lagoon), Nutrients, *Phosphorus, *Phytoplankton, Potamogeton-crispus, Ranunculus-fluitans, Season, Veronica-anagallis-aquatica, Aquatic vegetation, Dune lakes, Eutrophication.

A 3 yr survey of aquatic vegetation of a New Zealand dune lake is described. Pukepuke Lagoon is a shallow (max. depth 85 cm), slightly saline lagoon with 15 ha of open water. Its inflows drain intensively farmland and are rich in nutrients, especially P. Dense macrophyte crops characterized the lagoon each spring but the component species differed each year. After a severe drought which dried most of the lagoon bed in the 1969-70 summer, Veronica anagallis-aquatica and Ranunculus fluitans were the dominant species in 1970, then with normal water levels Chara globularis became dominant throughout 1971, followed by Potamogeton crispus in 1972. Factors that enabled the dominant species to gain an early competitive

advantage are discussed. Drying of the lagoon bed in 1970 is regardced as the major disrupting feature that initiated the sequence of plant species described. Phytoplankton crops, estimated from chlorophyll a pigment, were low during macrophyte growth phases but reached peaks in the summer of 1971-72 and 1972-73; the former being responsible for the destruction of Chara. The competitive balance between phytoplankton and macrophytes is a delicate one but the shallow water of Pukepuke Lagoon tends to favor the macrophytes.--Copyright 1974, Biological Abstracts, Inc.
W75-03087

EFFECTS OF RECREATION ON WATER QUALITY,
Idaho Univ., Moscow. Coll. of Forestry, Wildlife and Range Sciences.
J. G. King, and A. C. Mace, Jr.
Journal Water Pollution Control Federation, Vol 46, No 11, p 2453-2459, November 1974. 2 fig, 4 tab, 7 ref.

Descriptors: *Water quality, *Water pollution, *Coliforms, *Phosphorus, *Minnesota, Eutrophication, Recreation, Camp sites, Recreation wastes, Lakes.
Identifiers: Boundary Waters Canoe Area(Minn), Pristine lakes, Moose Lake Chain(Minn), Lake Isabella(Minn).

The Boundary Waters Canoe Area in northern Minnesota is the most heavily used wilderness area in the United States. The majority of its visitors participate in water-based recreational activities that contribute detergents, and sanitary, outboard motor, and solid wastes to the natural chemical budget of the pristine lakes. The purpose of this research project was to determine if recreational use causes reduction of water quality in bodies of water located near campsites. Nine parameters of water quality were measured in water near campsites and near unused shorelines for comparison. The parameters measured were dissolved oxygen saturation, temperature, turbidity, hydrogen ion concentration, specific conductivity, nitrate (plus nitrite) concentration, available phosphate concentration, total Kjeldahl nitrogen concentration, and coliform bacteria population. The results show that use of campsites causes highly significant increases in coliform bacteria populations and smaller increases in available phosphate concentrations in water near the campsites. One probable cause of these increases is drainage from the pit toilets located at each campsite. (Gibb-ISWS)
W75-03094

IMPACTS OF COLORADO RIVER SALINITY,
Colorado River Board of California, Los Angeles.
V. E. Valantine.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 100, No IR4, Proceedings Paper 10985, p 495-510, December 1974. 6 tab, 9 ref, 1 append.

Descriptors: *Colorado River Basin, *Costs, *Drainage, *Irrigation, *Salinity, Agriculture, Economics, Salt tolerance, Water quality, Colorado River, Arizona, California, Nevada.

Even though Colorado River water has been successfully used for irrigation in California and Arizona for the past 80 years, its relatively high dissolved salt content imposes severe economic costs on its users. By the year 2000, Lower Basin users of Colorado River Water can suffer detriments amounting to $80,000,000, if control measures are not instituted to prevent increased concentration of dissolved solids, or salinity. Projected increases in water consumption in the Colorado River Basin will cause an increase in salinity of 330 mg/l by the year 2000 at Imperial Dam. The effects of increased salinity on agricultural and domestic water users and measures intended to cope therewith were described. Data were provided on current estimates of Colorado River water depletions up to the year 2000 and the effect they will have on salinity. Data from studies of penalty costs due to salinity were used to determine the full economic impact on users of Colorado River water in Arizona, California, and Nevada for the years 1980, 1990, and 2000. (Harmeson-ISWS)
W75-03102

EFFECTS OF SILVER FROM CLOUD SEEDING ON MICROFLORA OF ANIMAL DIGESTIVE SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Fishery and Wildlife Biology.
J. A. Bailey.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-226 062, $3.75 in paper copy, $2.25 in microfiche. September 1973. 40 p, 10 tab, 1 fig, 98 ref.

Descriptors: *Wildlife, Weather modification, Cloud seeding, *Silver iodide, Inorganic compounds, Microorganisms, *Digestion, Ruminants, *Water pollution effects.
Identifiers: Silver nitrate, Cecum, Rumen.

Potential health hazards to digestion in microorganisms caused by silver iodide, an artificial nucleating agent utilized in many weather modification programs, were found to be minimal in recent experiments. 24 rabbits were fed pelleted rabbit food dosed with silver compounds. Samples of feed, feces, cecal pellets and body tissue were later analyzed. Experiments were also conducted to test effects of silver upon goat rumen microbial digestion in vivo and in vitro. The rabbits eliminated 99% of an oral dose of silver iodide within three days and virtually all within 6.3 days. Only eight to 26 per cent entered the cecum. Chronic intake did not result in accumulation within the cecum. Digestion was not affected either by consumption of a ratio containing 4.5 ppm silver-iodide or 10 ppm silver nitrate. Folic acid synthesis by cecal microflow was not reduced by intake of 5ppm. In goats a chronic intake of 1 ppm did not cause an accumulation within the rumen. Silver passed from the rumen with a half-time of 1.3 days. Neither silver iodide simulation 1 ppm in the diet nor silver nitrate simulation 100 ppm inhibited rumen digestion rates. (Schroeder-Wisconsin)
W75-03134

AN OUTBREAK OF HEPATITIS-A ASSOCIATED WITH RECREATIONAL LAKE WATER,
Center for Disease Control, Atlanta, Ga. Viral Disease Branch.
J. A. Bryan, J. D. Lehmann, I. F. Setiady, and M. H. Hatch.
Am J Epidemiol, Vol 99, No 2, p 145-154, 1974, Illus.

Descriptors: Recreation, *Recreation facilities, *Camping, *Lakes, *South Carolina, Pollution, Water pollution, Water pollution sources, Public health, *Diseases, *Human diseases, Water pollution effects.
Identifiers: *Hepatitis-A.

In a 15-day period in Sept. 1969, 14 cases of viral hepatitis, type A (hepatitis-A), developed in members of a Boy Scout Troop who had been camping on an island in a lake recreation area (South Carolina) about 4 wk earlier. The clustering of cases by onset date over a short time interval, the appearance of cases only among those troop members attending the campout, the absence of known prior exposure to hepatitis-A and the absence of hepatitis-B antigen in all but 1 of the cases, suggested a common-source exposure to hepatitis-A virus. Raw lake water, which was grossly contaminated and inadvertently consumed by many campers, was associated with a statistically significant risk of hepatitis-A. Since use of recreational waters is a very popular pastime, physicans should be alert to the possibilities that acquisition of hepatitis-A can occasionally result from such activities.--Copyright 1974, Biological Abstracts, Inc.
W75-03149

A METHOD FOR THE RELATIVE CLASSIFICATION OF LAKES IN THE STATE OF WASHINGTON FROM RECONNAISSANCE DATA,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 2H.
W75-03152

EFFECT OF IRRIGATION PUMPING ON DESERT PUPFISH HABITATS IN ASH MEADOWS, NYE COUNTY, NEVADA,
Geological Survey, Denver, Colo.
W. W. Dudley, Jr., and J. D. Larson.
Open-file report 74-188, August 1974. 142 p, 24 fig, 8 tab, 26 ref.

Descriptors: *Springs, *Nevada, *Killifishes, *Aquatic habitats, *Water level fluctuations, Fish conservation, Fish populations, Hydrogeology, Withdrawal, Water wells, Groundwater basins, Drawdown.
Identifiers: *Cyprinodon diabolis, *Desert pupfish, *Devils Hole(Nev).

Local pumping of groundwater has lowered the pool level in Devils Hole, Nevada, decreased the flow of springs in the Ash Meadows area, and endangered the habitat of the Devils Hole pupfish. The Ash Meadows area, at the southern tip of the Amargosa Desert in southern Nevada, discharges groundwater collected over several thousand square miles of a regional flow system developed in Paleozoic carbonate rocks. Water moves westward across fault contacts from the bedrock into poorly interconnected gravel, sand, and terrestrial-limestone aquifers in the upper few hundred feet of the basin sediments at Ash Meadows. A small pool in Devils Hole, which is a collapse depression in Cambrian limestone, and numerous springs in the adjacent desert valley contain rare fish species of the genus Cyprinodon, faunal remnants of Pleistocene lakes. The Devils Hole pupfish, C. diabolis, is the most endangered of the several surviving species that have evolved since the post-pluvial isolation of their ancestors. This population feeds and reproduces on a slightly submerged rock ledge. The recent irrigation pumping has nearly exposed this ledge. Correlation of pumping histories with the stage in Devils Hole allows identification of several wells that affect the pool level most severely. Some springs that are habitats for other species of Cyprinodon also have reduced discharge because of pumping. (Knapp-USGS)
W75-03163

HEART DEATHS AND FLUORIDATION,
I. Jansen, and H. M. Thomson.
Fluoride, Vol 7, No 1, p 52-57, 1974, Illus.

Descriptors: Diseases, Public health, *Wisconsin, *Fluoridation, *Water treatment, *Mortality.
Identifiers: *Heart disease.

In the city of Antigo, Wisconsin, fluoridation of the public water supplies was initiated in 1949. It was discontinued in Nov. 1960, and reinstituted in Oct. 1965. A striking increase in the rate of deaths from heart disease occurred in Antigo immediately following the introduction of fluoridation in 1949 and following its resumption in 1965. This trend was also evident when the death rates from heart disease in Antigo were compared with those of the USA as a whole. Among older individuals, the rise in mortality after initiation of fluoridation was much higher than among younger people.--Copyright 1974, Biological Abstracts, Inc.
W75-03172

THE GREAT LAKES REDISCOVERED,
Wisconsin Univ., Madison. Marine Studies Center.
For primary bibliographic entry see Field 5B.
W75-03173

ENTERIC BACTERIOPHAGES IN SAINT LOUIS BAY, MISSISSIPPI,
Mississippi Univ., University. Dept. of Biology.
For primary bibliographic entry see Field 5B.
W75-03185

SHORELINE FORESTS OF LAKE TE ANAU, FIORDLAND,
Otago Univ., Dunedin (New Zealand). Dept. of Botany.
C. D. Meurk.
N Z Ecol Soc Proc, 20, p 96-102, 1973, Illus.
Identifiers: Fiordland, *Forests, Impoundments, Lakes, *New Zealand(Lake Te Anau), *Shorelines, Soils, Water table, *Soil moisture.

Those sections of forest along the Te Anau lake shore (New Zealand), resting on unconsolidated material and within about 3 m of the maximum natural lake level (204.3 m above mean sea level), could be threatened by the predicted water table effects of this forest were investigated. Five forest associations were recognized, apparently related to differences in soil moisture conditions.--Copyright 1974, BiologicalAbstracts, Inc.
W75-03191

PHOTOSYNTHETIC PHYTOPLANKTON ACTIVITY IN THE IVANKOVO RESERVOIR, IN THE ZONE OF HEATED WATER FROM THE KONAKOVO STATE REGIONAL ELECTRIC POWER STATION, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
M. B. Vainshtein, V. G. Devyatkin, and I. V. Mitropol'skaya.
Gidrobiol Zh, Vol 9, No 6, p 22-29, 1973, Illus.
Identifiers: Asterionella-formosa, Autumn, Binuclearia, Electric power stations, *Heated water, Melosira, Melosira-italica, Pandorina-morum, *Photosynthesis, *Phytoplankton, Pollution, Reservoirs, Scenedesmus, Spring, Stephanodiscus, Summer, Tabellaria, *Thermal pollution, *USSR(Ivankovo reservoir), Water temperature, *Algae.

In the USSR during spring and autumn, when flowing through the condensators of Konakovskaya SREP (state regional electrical power station), alga showed no decrease in their photosynthetic activity. A slight decrease was observed in some summer periods. The acclimation of the plankton phytocoenosis to the heightened water temperature was pointed out in a flow through the drain channel and Moshkovicheskiy Bay. This resulted in the optimal photosynthetic temperature rise towards the end of the heat bay. The genera predominating by biomass are Tabellaria, Stephanodiscus and Melosira; whereas Scenedesmus, Melosira and Binuclearia predominate by number. The above genera were studied along with M. italica, Asterionella formosa and Pandorina morum.--Copyright 1974, Biological Abstracts, Inc.
W75-03193

ACID RAIN: FOSSIL SULFUR RETURNED TO EARTH,
Massachusetts Audubon Society, Lincoln.
For primary bibliographic entry see Field 5B.
W75-03197

GROWTH OF SPIRULINA MAXIMA ALGAE IN EFFLUENTS FROM SECONDARY WASTEWATER TREATMENT PLANTS,
University of Western Ontario, London. Dept. of Chemical and Biochemical Engineering.
For primary bibliographic entry see Field 5D.
W75-03229

LIMNOLOGICAL INVESTIGATIONS OF A FISH-POND SUPPLIED WITH SEWAGE-WATER IN THE VICINITY OF LAKE BALATON,
Magyar Tudomanyos Akademia, Tihany. Biological Research Inst.
For primary bibliographic entry see Field 2I.
W75-03249

OCCURRENCE OF TOXIC ALGA PRYMNESIUM PARVUM CARTER IN WATER BODIES OF THE SOUTH UKRAINIAN SSR, (IN UKRAINIAN),
Ukrainian Research Inst. of the Fish Industry, Kherson (USSR).
H. P. Krasnoshchok.
Ukr Bot Zh, Vol 30, No 5, p 631-635, 1973, Illus, English summary.
Identifiers: Bullheads, Carp, *Prymnesium-Parvum, Salinity, Stickleback, *Ukrainian-SSR, Water temperature, *Algae(Toxic), Fish ponds, Toxicity.

Data are presented on the occurrence and number of the toxic golden alga P. parvum in water bodies of the South Ukraine (USSR). Morphological peculiarities of the monads at different temperature of water are described. In Nov., 1969, when P. P. parvum reached 665 million cells/l in a pond with 4.4 g/l salinity and a temperature of 4-5C, the death of stickleback, bullheads and carp was observed. In the pond 'Novyi' (the Kazanka State Breed Fish-rearing Farm in the Nikolaev region) with water salinity of 4.4 g/l at a temperature of 4-5C P. parvum reached 720 million cells/l and the fingerlings and carp died.--Copyright 1974, Biological Abstracts, Inc.
W75-03250

EFFECTS OF ANTITRANSPIRANTS ON SEED GERMINATION, GROWTH AND SURVIVAL OF TREE SEEDLINGS,
Purdue Univ., Lafayette, Ind. Dept. of Forestry and Conservation.
For primary bibliographic entry see Field 2I.
W75-03253

ANTHOCYANIN DEVELOPMENT IN MANGO FRUIT IN RESPONSE TO A PREHARVEST ANTITRANSPIRANT SPRAY,
Florida Univ., Homestead. Inst. of Food and Agricultural Sciences.
For primary bibliographic entry see Field 2I.
W75-03254

OBSERVATIONS ON STRIGEID METACERCARIAE IN THE EYES OF FISH FROM HANNINGFIELD RESERVOIR, ESSEX, ENGLAND,
Marine Lab., Aberdeen (Scotland).
R. Wootten.
J Helminthol, Vol 48, No 1, p 73-83, 1974.
Identifiers: *Brown trout, Diplostomum-spathaceum, Eel, *Fish eyes, Loach, *Metacercariae, Perch, *Rainbow trout, Reservoirs, Roach, Ruffe, Stickleback, Strigeid, Trout, Tylodelphys-clavata, Tylodelphys-podicipina, *United Kingdom(Essex-Eng), Fish ponds.

A comparative study was made of the occurrence of the metacercariae of Diplostomum spathaceum, Tylodelphys clavata and T. podicipina in the eyes of brown and rainbow trout, perch, ruffe, roach, ten-spined stickleback, eel and stone-loach, from Hanningfield Reservoir, Essex between Jan. 1968 and March 1969. D. spathaceum was found in all fish species and T. clavata in all except eel and stone-loach. The degree of infection varied considerably between different host species. T. podicipina occurred mainly in young perch but was also found in rainbow trout and ruffe. D. spathaceum normally occurring in the lens was also found in considerable numbers in the humor of the eye in brown and rainbow trout, perch and ruffe. Infection with D. spathaceum and T. clavata increased with length and age of the host although in some host species there was a reduction in the largest fish examined. Newly introduced rainbow trout became infected with D. spathaceum and T. clavata during their 1st summer in the reservoir.--Copyright 1974, Biological Abstracts, Inc.
W75-03256

ESCAPE OF INFECTIVE LARVAE OF BRUGIA PAHANGI FROM AEDES AEGYPTI INTO WATER,
Harvard School of Public Health, Boston, Mass. Dept. of Tropical Public Health.
R. W. Gwadl, and E. Chernin.
Trans R Soc Trop Med Hyg, Vol 67, No 6, p 814-818, 1973.
Identifiers: *Aedes-aegypti, Anesthetics, *Brugia-pahangi, Infective larvae, Insecticides, Trauma, Water pollution effects.

Infective larvae of B. pahangi escape into water from A. aegypti killed by anesthetics, insecticides, or trauma. Some larvae migrate within the host, especially to the abdomen where they remain alive for at least 72 h. Once liberated into water some larvae survive for at least 24 h.--Copyright 1974, Biological Abstracts, Inc.
W75-03257

EFFECTS OF 2,4-D-NA OF VARIOUS CONCENTRATIONS ON RESPIRATION OF AN AQUATIC CRUSTACEAN ASELLUS AQUATICUS L,
Polish Academy of Sciences, Warsaw. Inst. of Experimental Biology.
D. Zimakowska.
Pol Arch Hydrobiol, Vol 20, No 3, p 469-473, 1973, Illus.
Identifiers: *Asellus-aquaticus, *Crustacean, Ix-Oxidative, *Oxygen consumption, Phosphorylation, Respiration, Sodium, *2, 4-D, Water pollution effects.

Effects of 2,4-D-Na concentrations of 1.25, 2.50, 5.00 and 7.50 mM on O2 consumption by A. aquaticus males after 6, 12 and 24 h expositions in a given solution were investigated. Effects of 2,4-D-Na concentrations on O2 consumption in A. aquaticus were significant. An especially high increase of O2 consumption (up to 142.1% of that of the control) was observed under the influence of 5.00 mM concentration. It seems to be the critical concentration for A. aquaticus. It can be supposed that 2,4-D-Na influences the respiratory chain and causes oxidative phosphorylation to be uncoupled.--Copyright 1974, Biological Abstracts, Inc.
W75-03260

DEPTH EFFECTS AND GENETIC INFLUENCES ON INJURY CAUSED BY ARTIFICIAL SEA WATER FLOODS TO LOBLOLLY AND SLASH PINE SEEDLINGS,
Mississippi State Univ., State College. Dept. of Forestry.
For primary bibliographic entry see Field 3F.
W75-03261

EFFICACY OF SPECIFICALLY-DEVELOPED PETROLEUM HYDROCARBONS AS ANOPHELES CONTROL AGENTS,
Texas Univ., Galveston. Medical School.
For primary bibliographic entry see Field 5G.
W75-03266

ODOR EFFECTS OF PYRIDINE-MONTMORILLONITE IN AQUEOUS SOLUTION,
R. A. Baker, and M.-D. Luh.
Sci Total Environ, Vol 2, No 1, p 13-20, 1973.

Identifiers: Aqueous solutions, Control, *Montmorillonite, *Odor, *Pyridine, Olfactory response(Human), Organoleptic properties, Water pollution effects.

The threshold odor response of individuals to aqueous solutions of pyridine with and without the presence of sodium montmorillonite was determined at 24 and 40C. At 24C there was a significant olfactory effect at pyridine-clay concentrations that produced no effect at 40C. The olfactory effect depended on the relative sensitivity of the panelists. The ability to predict modification of olfactory response to aqueous organic solutions caused by the presence of clay mineral particulates would be valuable for water quality protection.--Copyright 1974, Biological Abstracts, Inc.
W75-03267

OIL POLLUTION MONITORING IN THE LAGOON OF VENICE USING THE MUSSEL MYTILUS GALLOPROVINCIALIS,
Istituto di Biologia del Mare, Venice (Italy).
For primary bibliographic entry see Field 5A.
W75-03269

THE EFFECTS OF MINE AND DOMESTIC WASTES ON MACROINVERTEBRATE COMMUNITY STRUCTURE IN THE COEUR D' ALENE RIVER,
Idaho Univ., Moscow. Dept. of Biological Sciences.
N. L. Savage, and F. W. Rabe.
Northwest Science, Vol 47, No 3, p 159-168, 1973. 3 fig, 4 tab, 22 ref. OWRT B-044-WASH(3), OWRT B-015-IDA(5).

Descriptors: *Water quality, *Mining, *Water pollution effects, *Heavy metals, Invertebrates, Sewage, *Idaho, Zinc, Copper, Lead, Cadmium, *Mine wastes.
Identifiers: Coeur k' Alene River(Ida).

Cities and industries in the Coeur k' Alene mining district of northern Idaho have discharged a wide range of waste materials into the South Fork of the Coeur d' Alene River since the beginning of mining activities in 1885. Mining, milling, and smelting of rich Pb-Ag-Zn ores have contributed fine inorganic solids from silt to colloidal in size as well as heavy metal ions including Zn, Cd, Cu, and Pb. Other industries, including a phosphoric acid plant, a fertilizer plant, and a sawmill, contribute high nutrient wastes, and cities discharge untreated domestic sewage directly into the river. In 1932, Ellis conducted an investigation of the physiocochemical and biological conditions of the river and found it nearly devoid of life from the city of Wallace on the South Fork to the mouth of the main stem at Coeur d' Alene Lake, a distance of 80 km. He attributed the absence of aquatic organisms to the large amounts of suspended solids and to the toxic action of Zn. Little was done to improve water quality until 1968 when settling ponds were constructed by the mining companies throughout the South Fork valley to impound all ore mill tailings, the main source of inorganic solids. The present study was the first since Ellis' work to examine the benthic macro-invertebrate community in the Coeur d' Alene River. The objective was to determine the effect of reduction in tailings discharge on benthic community composition. This study entailed examination of unaltered sections of the river for control purposes and monitoring of the test stations before and after impoundment (1968-1971).
W75-03275

OIL AND PUGET SOUND,
M. F. Baldwin, and P. L. Baldwin.
The Living Wilderness, p 14-23, Autumn, 1973. 2 photo, 1 map.

Descriptors: *Sounds, *Oil pollution, *Water pollution, *Oil spills, *Pipelines, Channels, Coasts, Ocean currents, Oil, Oil industry, Exploitation, International Waters, Water pollution sources, Oil water, Environment, Environmental effects, *Washington.

The construction of the trans-Alaska pipeline promises environmental consequences far beyond its terminal point at Valdez. The consequences of that event to the Puget Sound are discussed. The major concern is the probability of more intensive coastal oil development and tanker traffic, and the consequent effect on the fishing and tourist industries. It is suggested that a new Atlantic Richfield refinery at Cherry Point is the first of many more to come. The present day tanker traffic and the possible increases with greater oil production development are explained. The tanker routes are treacherous, and the risks of oil spills great, especially if the new supertankers are employed. The tankers and the methods of containing and cleaning oil spills in the Puget Sound area are described. The possibility of damage to marine life, not only by oil spills, but also offshore drilling development, is explored. A three-fold program to influence government and industry decisions about Puget Sound is suggested. First, examine and articulate environmental costs; secondly, offer help to agencies needing information; and finally, suggest ways to meet energy supply and transportation problems with minimal ecological disruption. (Craig-Florida)
W75-03281

PESTICIDE LEVELS IN ESTUARINE AND MARINE FISH AND INVERTEBRATES FROM THE GUATEMALAN PACIFIC COAST,
Galveston Marine Lab., Tex.
For primary bibliographic entry see Field 5B.
W75-03284

EFFECTS OF IRRIGATION ON MOSQUITO POPULATIONS AND MOSQUITE-BORNE DISEASES IN MAN, WITH PARTICULAR REFERENCE TO RICEFIELD EXTENSION,
Microbiology Research Establishment, Salisbury (England). Arbovirus Epidemiology Unit.
G. Surtees.
Int J Environ Stud Vol 1, No 1, p 35-42, 1970.
Identifiers: Arboviruses, Birds, Hosts, *Irrigation, Mosquitos, *Mosquito-borne diseases, Rice, Transmission, Vectors, Vegetation, Vertebrates, *Human diseases, Water pollution effects.

The modification by man of his environment, particularly for large-scale irrigation and ricefield extension, often results in increased incidence of mosquito-borne disease in associated human populations. Habitat modification leads to changes in the species composition of mosquitoes and thus the variety of disease agents to which man is exposed. Increased acreage of water attracts birds which act as hosts of arboviruses while a raised water table leads to marginal marshy areas and humid peripheral vegetation. These 2 aspects of the environment favor extended breeding and survival, respectively. Higher atmospheric humidity enhances mosquito survival and the transmission of disease. Associated urban resettlement encourages domestic mosquito species and effects the distribution and abundance of vertebrates which may act as hosts of disease agents.--Copyright 1974, Biological Abstracts, Inc.
W75-03288

210PB AND 210PO CONTENT IN AIR, WATER, FOODSTUFFS, AND THE HUMAN BODY,
Ministerstvo Zdravookhraneniya SSSR, Moscow. Institut Biofiziki.
For primary bibliographic entry see Field 5B.
W75-03289

ECOLOGICAL MAPPING OF CIRCULATING WATER IN BADEN-WUERTTEMBERG, (IN FRENCH),
Baden-Wuerttemberg Landesstelle Gewaesserkunde, Karlsruhe (West Germany).
W. K. Besch.
Ann Hydrobiol. Vol 4, No 1, p 1-9, 1973, Illus. English summary.
Identifiers: Chemical wastes, Ecological studies, Organisms, Oxygen deficiencies, Pollution, *Toxicology, *West Germany(Baden-Wuerttemberg), *Water quality, *Thermal pollution, *Bioindicators, Biodegradation.

The method used in the province of Baden-Wuerttemberg (West Germany) for assessing and mapping water quality is described. In contrast to all other methods, it furnishes an overall classification of water quality and takes into account numerous parameters. Thermal pollution, toxic pollution of known origin and O2 deficiencies are defined according to the maximal tolerances of indicator organisms. These are widely distributed forms and their physiology is sufficiently well known. The load of organic biodegradable material is determined by the quantity and the quality of organisms which thrive particularly well in its presence. The classes of this type of pollution are indicated by average values of chemical indicators such as NO2-, NH4+ and BOD5(biological oxygen demand).--Copyright 1974, Biological Abstracts, Inc.
W75-03293

SURVIVAL OF SMALL AMOUNTS OF COXSACKIE A4 VIRUS IN DANUBE RIVER WATER UNDER LABORATORY CONDITIONS,
Ustav Hygieny a Epidemiologie, Bratislava (Czechoslovakia).
For primary bibliographic entry see Field 5B.
W75-03294

5D. Waste Treatment Processes

WASTEWATER RECLAMATION UNDER TROPICAL CONDITIONS,
Asian Inst. of Tech., Bangkok, (Thailand). Dept. of Environmental Engineering.
M. G. McGarry, K. S. Ng, N. H. Leung, and T. L. Lee.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 61-75. 4 fig, 18 ref.

Descriptors: *Waste water treatment, *Filtration, *Oxidation lagoons, *Nutrient removal, *Algae, Activated carbon adsorption, Biochemical oxygen demand, Chlorination, Photosynthesis, Water reuse, Reclamation, Waste water(Pollution), Nitrogen, Planning, Water pollution control.
Identifiers: *Thailand(Bangkok), Nitrogen stripping, Roughing filters.

The development of unit processes and their integration for purposes of reclaiming domestic wastewater for municipal and industrial reuse were described. Two integrated processes were utilized. Common to both were two high rate oxidation ponds followed by roughing filters that were effective in reducing BOD levels to less than 20 mg/1 and in removing much of the nitrogen. The clarified N-stripped effluent of the second roughing filter normally exhibited COD levels above 30 mg/1. Two alternative processes of COD removal were investigated. The first involved powdered activated carbon adsorption, upflow, sedimentation, and dual media filtration. The second consisted of semi-rapid filtration. The average level of final effluent total nitrogen was 8.8 mg/1-N for the carbon absorption process and 8.2 mg/1-N for the semi-rapid filtration process. Average final effluent COD levels were 5.5 and 11.0 mg/1 respectively. (See also W75-02751) (Harmeson-ISWS)

W75-02756

NOTES ON A HISTORY OF WATERUSE,
Wisconsin Univ., Madison. Coll. of Agricultural and Life Sciences.
I. Gyuk.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 233-242. 4 ref.

Descriptors: *Water resources, *Water users, *Waste disposal, *History, Waste water, Water supply, Water conservation, Sewage disposal, Water conveyance, Irrigation practices, Ecology, Water utilization, Social aspects.
Identifiers: Resource depletion, Water borne diseases.

The ways in which various cultures solved their problems of water supply and waste disposal were discussed. Starting with the organic beginnings of unicellular organisms and their need for nourishment as well as to eliminate toxic refuse, the history of water use as it relates to past civilizations was outlined. Man's technology was shown as peculiarly capable of interfering with ecology so that cultural collapse of civilizations could be traced to misuse of water. Examples of recent technological difficulties in the United States, such as the Great Plains Dust Bowl and the current energy crisis, were considered warnings that man must reconsider his whole approach to the use of water as a resource. (See also W75-02751) (Roberts-ISWS)
W75-02771

WASTEWATER RECLAMATION AND REUSE IN ISRAEL,
Technion - Israel Inst. of Tech., Haifa (Israel).
G. Shelef.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 315-325. 4 fig, 2 tab, 13 ref.

Descriptors: *Cost-benefit analysis, *Desalination, *Reclaimed water, *Water resources, *Water requirements, Economic justification, Water reuse, Artificial recharge, Benefits, Eutrophication, Groundwater recharge, Waste treatment, Tertiary treatment, Planning, Water supply.
Identifiers: Dan Region Project, *Israel, Jerusalem, Eilat.

Israel currently is meeting its water resource demands by using over 90% of its available ground and surface water. Renovated wastewaters and desalinated waters currently provide only about 3% of the total needed. Total annual demand is projected to increase approximately 30% over current demands by 1990. In order to meet future national goals in industrial development, population growth, and agricultural production Israel is planning increased development of wastewater renovation and water desalination. In 1972, renovated wastewater provided 2.6% of the annual supply. According to present plans 19% of the 1990 supply will come from wastewater reclamation and renovation. Desalinated water, which made up 0.1% of the 1972 supply, will increase to 2.1% of the 1990 supply. Projects for both centralized and local agricultural reuse of reclaimed and/or renovated wastewater; industrial reuse; and the Dan Region Project which is designed to treat and fully reclaim the effluent from the Greater Tel Aviv area were summarized. Jerusalem's water supply needs beyond 1990 may be met by the use of recycled, fully reclaimed wastewater. Other communities that now obtain their water supply from desalinated seawater may, in the future, resort to wastewater reclamation for a part of their needs. (See also W75-02751) (Harmeson-ISWS)

W75-02779

WASTEWATER RECLAMATION AND REUSE IN THE SUISUN MARSH CALIFORNIA, U.S.A.,
Bureau of Reclamation, Sacramento, Calif.
W. M. Roche.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 326-335. 2 fig, 7 ref.

Descriptors: *Waste water treatment, *Water reuse, *Marsh management, *California, *Reclamation, Reclaimed water, Management, Planning, Waste water disposal, Water sources, Nitrogen, Evaluation, Water quality, Industrial water, Municipal water.
Identifiers: *Suisun Marsh(Calif).

The U.S. Bureau of Reclamation, Solano Irrigation District, and City of Fairfield are conducting a Wastewater Reclamation and Reuse Pilot Demonstration Program in the Suisun Marsh, Solano County, California. The program objective is to demonstrate the compatibility of beneficial reuse and treatment of municipal and industrial wastewater with marsh management. The Program is designed to provide information to assist the local area in meeting its waste treatment and disposal obligations, to provide information on the reuse of wastewater for agricultural purposes, and to provide the Bureau of Reclamation with information on a source of water for meeting its responsibility for protection of the Suisun Marsh. The program evaluates several features which beneficially use wastewater and also remove nitrogen. Field facilities include a detention reservoir, a sprinkler-irrigated and tile-drained pasture, marsh ponds, and irrigated marshland. The facilities are designed to remove 90% of the nitrogen from the wastewater that eventually flows to the marsh channels. (See also W75-02751) (Scott-ISWS)
W75-02780

THE EFFECT OF SELF PURIFICATION OF FLOWING WATER,
Seoul National Univ. (Republic of Korea). Dept. of Civil Engineering.
T. S. Won.
In: Water for the Human Environment, Volume III, Technical Sessions Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 351-359. 12 fig, 3 tab.

Descriptors: *Self-purification, *Water purification, *Streamflow, *Waste assimilative capacity, *Water quality, Water chemistry, Water pollution, Flow duration, River flow, Running waters, Chemical analysis, Rivers, Streams, Biochemical oxygen demand, Analytical techniques, Mathematics, Dissolved solids, Bacteria, Suspended solids, Chemical oxygen demand.
Identifiers: *Korea(Han River), Transparency, Number of germs.

A quantitative relationship was shown between the self-purification of a flowing stream and the distance of flow. The parameters studied to determine self-purification included: (1) transparency, (2) total solids content, (3) suspended solids content, (4) dissolved solids content, (5) biochemical oxygen demand, (6) chemical oxygen demand, and (7) bacterial count. The relationship found to exist may be expressed by the equation: delta q = aL + b, where delta q = amount of self-purification between two adjacent stations; L = flowing distance between adjacent stations; and a,b = constants. (See also W75-02751) (Henley-ISWS)
W75-02782

WATER SUPPLY AND SEWER SYSTEM FOR THE CITY OF CHICAGO,
Chicago Dept. of Water and Sewers, Ill.
For primary bibliographic entry see Field 5F.

W75-02783

A NEW METHOD OF WATER AND SEWAGE PURIFICATION,
Polish Academy of Sciences, Gdansk. Inst. of Hydraulic Research.
J. Chrusciel.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 368-377. 2 fig, 4 tab, 12 ref.

Descriptors: *Water purification, *Sewage treatment, *Waste treatment, *Domestic wastes, *Industrial wastes, Coagulation, Water pollution treatment, Water quality control, Flocculation, Coals, Separation techniques, Water quality, Chemical wastes, Chemical precipitation, Sedimentation, Disinfection, Waste water, Leachate.
Identifiers: *Poland.

A method was described for the coagulation and precipitation of impurities from waste waters by using the leachate from the ashes of combusted coal. The method is suitable for purifying municipal waste waters and various industrial waste waters. Analyses of samples collected before and after purification were shown. The method offers a fast and effective method for purifying waste waters with inexpensive materials. (See also W75-02751) (Henley-ISWS)
W75-02784

LOWER COST METHODS OF WATER AND WASTE TREATMENT IN LESS DEVELOPED COUNTRIES,
Oklahoma Univ., Norman.
G. W. Reid, A. Talboys, and A. D. Swisher.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 388-395. 1 fig, 1 tab.

Descriptors: *Waste water treatment, *Water quality, *Treatment facilities, *Water resources development, *Water quality control, Water chemistry, Waste disposal, Sewage disposal, Waste water disposal, Municipal wastes, Analytical techniques, Sewage treatment, Septic tanks, Settling basins, Chemical analyses, Laboratory tests, Solid wastes, Evaluation, Diffusion.
Identifiers: *Developing countries, AID projects.

Earlier programs of foreign assistance have shown that the transferring of an advanced country's technology cannot, by itself, effectively solve a less developed country's problems. The only real answer is to develop and introduce processes which are specifically adapted to the local setting and individual problems. A global AID supported project is being initiated to determine such methods and their appropriate applications. To determine and verify by actual field demonstration the most promising and applicable techniques and systems of providing and maintaining simple, low cost water and waste treatment facilities for small as well as large communities in developing countries, the University of Oklahoma is undertaking a three-year program that is divided into four phases: (1) resource/technology analysis, (2) practical field studies, (3) evaluation and publication, and (4) diffusion. (See also W75-02751) (Henley-ISWS)
W75-02786

LABORATORY STUDIES OF THE HYDRAULIC PERFORMANCE OF ONE-STORY AND SPLIT-LEVEL RESIDENTIAL PLUMBING SYSTEMS WITH REDUCED-SIZE VENTS,
National Bureau of Standards, Washington, D.C. Center for Building Technology.
For primary bibliographic entry see Field 8B.
W75-02790

COMBINED APPARATUS FOR THE BIOLOGICAL PURIFICATION OF WASTE WATERS,
Degremont, Societe Generale d'Epuration et d'Assaninissement, Rueil-Naimaison (France). (assignee)
J. J. P. Bernard.
U. S. Patent No 3,834,540, 5 p, 5 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 926, No 2, p 485, September 10, 1974.

Descriptors: *Patents, *Aerators, *Waste water treatment, *Biological treatment, Pollution abatement, Water pollution control, Water quality control, *Water purification, Sludges, Equipment.
Identifiers: *Clarification.

At least two coupled clarification tanks are in communication with an aerator tank. The means for recycling the settled sludges consists of air pumps of the air lift type which discharge into the aerator from each of the clarifiers and which are fed with air with a pulsating intermittent flow, alternating in each of the clarifiers. The air lifts have a base which is flared with respect to their top. The base constitutes the orifice for the drawing in of settled sludges which are to be recycled. (Sinha-OEIS)
W75-02836

ACTIVATED SEWAGE PLANT AND PROCESS,
Dravo Corp., Pittsburgh, Pa. (assignee)
D. F. Heaney.
U. S. Patent No 3,835,038, 3 p, 5 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 926, No 2, p 606, September 10, 1974.

Descriptors: *Patents, *Sewage treatment, *Waste water treatment, *Chlorination, *Filtration, Pollution abatement, Water pollution control, Water quality control, Equipment, Activated sludge.

Raw sewage, after being contacted with activated sludge, is discharged into a settling tank from the top of which liquid is continuously discharged. The sludge is removed from the bottom and transferred to a stabilization zone. There is provided an in-depth filter through which the effluent liquid from the settling tank flows to the clearwell in which it is collected and chlorinated. Using two filters the sewage treatment plant can operate continuously. Backwash water is collected in a backwash well or compartment and returned to the initial contact zone at a metered rate. (Sinha-OEIS)
W75-02837

WASTE WATER TREATMENT SYSTEM,
Cubic Corp., San Francisco, Calif. (assignee)
D. Ciambrone.
U. S. Patent No 3,835,039, 4 p, 8 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 926, No 2, p 607, September 10, 1974.

Descriptors: *Patents, Pollution abatement, Water quality control, Water pollution control, *Waste water treatment, Sewage, Digestion tanks, *Aerobic bacteria, *Aerobic treatment, *Biological treatment, Filtration, Ozone, Separation techniques.

Sewage or waste water is fed to a digester-separator. This digester-separator comprises a container having a lower bulkhead leading to a sump with openings through the bulkhead. Elongated fiber bundles are positioned in the container and the container is air vented. Thus aerobic bacteria live in the container and in the recesses around the fibers and treat the waste water. The lower ends of the fibers are bunched into the openings, so that the water passing through the openings by gravity are filtered by the fibers. The filtered water or effluent passes into the sump and then through a plurality of conduits that are interconnected and vertically positioned. Ozone is generated and injected under pressure into the conduits through porous tubes that extend along the length of each of the conduits. This wide dispersion of ozone in the water effluent reduces the remaining bacteria and solids in the water. (Sinha-OEIS)
W75-02838

PROCESSES FOR THE PURIFICATION OF WASTE EFFLUENTS,
Tasman Vaccine Lab. Ltd., Upper Hutt (New Zealand). (assignee)
R. A. Grant.
U. S. Patent No 3,835,041, 8 p, 7 fig, 1 tab, 11 ref; Official Gazette of the United States Patent Office, Vol 926, No 2, p 607, September 10, 1974.

Descriptors: *Patents, *Proteins, *Ion exchange, *Waste water treatment, Pollution abatement, *Industrial wastes, Dairy industry, Fish handling facilities.
Identifiers: Abattoirs, Meat factories, Glue factories.

A process is described for the purification of a waste effluent containing protein. The process consists of: (a) passing the effluent through a bed of a granular ion exchange material in the form of a cross-linked regenerated cellulose modified by the introduction of cationic or anionic exchange groups to remove protein from the effluent; (b) recovering essentially protein-free effluent; and (c) subsequently regenerating the ion exchange material for use in a further cycle. (Sinha-OEIS)
W75-02839

REMOVAL AND RECOVERY OF CHROMIUM FROM POLLUTED WATER,
Sherbrooke Univ., (Quebec). (assignee)
J. M. Lalancette, and B. Coupal.
U. S. Patent No 3,835,042, 2 p, 4 ref; Official Gazette of the United States Patent Office, Vol 926, No 2, p 608, September 10, 1974.

Descriptors: *Patents, *Chromium, *Chemical wastes, Pollution abatement, Water pollution control, Water quality control, *Metals, *Waste water treatment, Filtration, Cadmium, Copper, Lead, Iron, Zinc, Mercury.
Identifiers: *Chemical treatment, Ferric salt, Peat moss, Industrial wastes recovery.

Chromium polluted solutions are treated by a process which avoids the necessity of reducing chromium VI to chromium III. A chromium sulfide complex is formed by adding a water-soluble ferric salt to the chromium polluted solution. The complex formed is insolubilized by treatment with a compound which when dissolved in water forms sulfide ions. The insoluble precipitate is separated by filtration through a bed of peat moss. The peat moss containing the insoluble chromium iron sulfide complex is oxidized under heat to recover the chromium as chromium oxide. If other metals such as cadmium, copper, lead, mercury, iron and zinc are present in the polluted solution they will also be recovered in the form of their oxides except the mercury which will be recovered as such by pyrolysis of the flue gases. (Sinha-OEIS)
W75-02840

METHOD OF FLOCCULATING,
V. A. Hussissian.
U. S. Patent No 3,835,045, 3 p, 3 fig, 11 ref; Official Gazette of the United States Patent Office, Vol 926, No 2, p 608, September 10, 1974.

Descriptors: *Patents, *Waste water treatment, *Flocculation, Pollution abatement, Water quality control, Water pollution control, Separation techniques, Polyelectrolytes.
Identifiers: *Chemical treatment, Alum, Sulfuric acid, Ferric chloride.

A flocculating method and apparatus are disclosed in which wash water is delivered into a flocculating tank, either directly or from a holding tank. Flocculating chemicals are proportioned into the flocculating tank and mixed with the wash water until the pH reaches a pre-established level. The flocculating substances may be alum and a polyelectrolyte such as sulfuric acid or ferric chloride. At this time the wash water is permitted to settle for a fixed period of time to permit the flocculated ink residue to settle to the bottom of the flocculating tank. Thereafter the clear effluent is drained off and the sludge is discharged by gravity onto a filter table where it is de-watered through a roll-fed web of filter paper. The web of filter paper with the de-watered sludge on it is conveyed into disposal bins. (Sinha-OEIS)
W75-02841

INHIBITING GROWTH OF MICROORGANISMS IN AQUEOUS SYSTEMS,
Givaudan Corp., Clifton, N.J. (assignee)
M. Manowitz, F. H. Sharpell, Jr., and C. Stegmann.
U. S. Patent No 3,843,519, 2 p, 3 tab, 3 ref; Official Gazette of the United States Patent Office, Vol 927, No 4, p 1637, October 22, 1974.

Descriptors: *Patents, *Waste water treatment, *Microorganisms, *Biodegradation, *Organic compounds, Water purification, Water quality control, Toxicity, Emulsions, Oil wastes, Water pollution effects.
Identifiers: *Biocides, *Antimicrobial agents, *Chemical treatment, Paraldol.

Toxicological and ecological properties of antimicrobials have become increasingly important and various active biocides can no longer be used due to their high toxicity and/or resistance to biodegradation. Therefore, in addition to efficacy and physical compatibilities, biodegradability and relatively low toxicity also are important requirements for an anti-microbial agent to be used in aqueous systems. Paraldol has been found to be effective for the protection of any non-sterile aqueous system against a broad spectrum of microoorganisms that attack such systems and is compatible with these systems. Paradol has relatively low toxicity and is biodegradable. Paraldol is effective in both acid and basic compositions and in the presence of nonionic, anionic, and cationic surfactants. Four examples are given. (Sinha-OEIS)
W75-02844

SEDIMENTATION APPARATUS,
Envirotech Corp., Salt Lake City, Utah. Eimco Process Machinery Div. (assignee)
B. J. Schochet, and P. J. Bsumek.
U. S. Patent No 3,833,126, 4 p, 5 fig, 1 ref; Official Gazette of the United States Patent Office, Vol 926, No 1, p 120, September 3, 1974.

Descriptors: *Patents, *Waste water treatment, *Pollution abatement, Water pollution control, Water quality control, *Sedimentation rates, Equipment, Separation techniques, Skimming, Sludges, *Settling basins.
Identifiers: Sedimentation apparatus.

An elevated boom draws a submerged blade-carrying rake arm in rotation about a vertical column to which the rake arm is connected by a coupling having but a single pivot axis. That axis is directed towards the outer end of the boom. The rake arm, when in motion, is pulled by draft means which fasten at spaced-apart points along the arm which converge therefrom to a common connecting means mounted near the outer end of the boom. The raking structure moves settled solids toward a discharge opening in the bottom of the sedimentation tank. (Sinha-OEIS)
W75-02846

METHODS AND MEANS FOR DISTILLATION OF LIQUIDS,
Nordnero A.B., Goteborg (Sweden). (assignee)
For primary bibliographic entry see Field 3A.
W75-02847

DISTILLATION OF LIQUID SOLUTIONS EXPANDED ALONG A CURVILINEAR SURFACE,
Compagnie Electro-Mecanique, Paris (France). (assignee)
For primary bibliographic entry see Field 3A.
W75-02848

AEROBIC WASTEWATER TREATMENT APPARATUS,
Northern Purification Services Ltd., North Vancouver (British Columbia). (assignee)
H. E. Kelsey.
U. S. Patent No 3,834,536, 6 p, 7 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 926, No 2, p 484, September 10, 1974.

Descriptors: *Patents, Pollution abatement, *Aerobic treatment, *Waste water treatment, Water pollution control, Water quality control, Equipment, *Aeration, *Settling basins.

A settling chamber is adapted to be placed within an aeration chamber. An outlet is controlled by a valve at the bottom of the settling chamber for periodically directing sludge out of the settling chamber into the aeration chamber. After a predetermined settling period, the supernatant liquid is discharged from the settling chamber. (Sinha-OEIS)
W75-02850

MULTI-STAGE EVAPORATOR,
For primary bibliographic entry see Field 3A.
W75-02851

APPARATUS FOR DREDGING DIVIDED SOLIDS SUBMERGED IN LIQUID,
L. A. Duval.
U. S. Patent 3,800,949. Official Gazette of the U. S. Patent Office, Vol 921, No 1, p 172, April 2, 1974. 1 fig.

Descriptors: *Equipment, *Patents, *Dredging, *Liquids, Pumps, Rotations, Pumping, Slurries, Solid wastes, Waste water treatment.
Identifiers: Boom.

An apparatus for removing finely divided solids collected in a sump or pit in association with water is described. A main frame supports the apparatus above the pit. There are two guides. The first guide is supported in the frame for vertical reciprocation, the second guide is supported within the first guide for rotation about a vertical axis. A boom extends outwardly and downwardly from the lower end of the second guide. The boom is tiltable about a horizontal pivot axis. There is a dredging head at the outer end of the boom which is adapted to reach various parts of the pit by manipulation of the apparatus. A pump is mounted inside the second guide with an intake line communicating to the dredge head so that the loosened solid material in somewhat of a slurry is able to be pumped out of the pit. (Merritt-FIRL)
W75-02855

NEW SEWER OUTFALL WILL SPAN THREE BRIDGES.
World-Construction, Vol 26, No 10, p 53-54, October, 1973.

Descriptors: Sewers, Engineering structures, *Outfall sewers, *Tunnels, Corrosion, Inhibition, *Concrete pipes, Gunite, Africa, *Bridges, *Waste water treatment.
Identifiers: *South Africa(Johannesburg), Diepsloot.

The Johannesburg's diepsloot outfall sewer contract is described. It is unusual because of the use of large diameter spun concrete piping, fissures in an ancient granite which imposed difficulties in tunnel construction, and the bridging of three valleys to carry the sewer near the outfall end. The value of the design was $4.51 million. Standardized bridge construction was used because of the short completion dates: bridge 1, 16 months; bridge 2, 18 months; and bridge 3, 20 months. The layout is based on a module of 20 meter spans for the bridge decks. Dolomitic aggregate was used to control the pattern of corrosion of tunnel concrete and shortcrete construction was used for the fissures. (Merritt-FIRL)
W75-02858

THREE-ELEMENT FORMING SPEEDS CONCRETE PIPE JOB,
For primary bibliographic entry see Field 8F.
W75-02864

TOXIC WASTE HANDLING BECOMES CHEAPER.
Materials Reclamation Weekly, Vol 124, No 1, p 22, January 5, 1974.

Descriptors: Waste disposal, *Landfills, *Waste water disposal, Metals, *Heavy metals, Waste storage, Municipal wastes, *Waste water treatment.
Identifiers: Chemfix, Mobile trailer.

A process for the fixing of toxic wastes such as heavy metals in solution so that the final solid product can be used as impervious landfill with very low leaching levels is being introduced into the United Kingdom. The Chemfix process involves the use of a 40 foot mobile road trailer in which reagents are housed for metering into the toxic waste and pumping the fixed product, which sets hard after a certain length of time, to the discharge point. Costs for the system, including disposal, but excluding hauling charges, were between 1.8 and 3.8 p/gallon, (approximately 4.3 to 9.1 cents/gallon) depending on the waste being processed. The process is being operated wherever quantities of waste, either in lagoons or storage tanks, exceed 50,000 gallons. In the United States, the process was developed to handle a wider range of materials and to cope with more frequent occurrence of homogenous wastes than those found in the United Kingdom. For economic reasons it is preferred that the suspended solids are in a five percent or more proportion to the liquid, and that the wastes contain appreciable amounts of inorganic sludge and suspended solids, particularly heavy metals. (Merritt-FIRL)
W75-02865

DEVELOPMENT OF A REFERENCE RAIN SYSTEM FOR THE DIMENSIONS OF SEWER NETWORKS (ENTWICKLUNG EINES BERECHNUNGSREGENS FUER DIE BEMESSUNG VON KANALNETZEN),
V. Sifalda.
GWF - Wasser/Abwasser, Vol 114, No 9, p 435-440, September, 1973. 3 fig, 4 tab, 7 ref.

Descriptors: *Rainfall intensity, Rain, Rates, Runoff, *Rainfall-runoff relationships, *Sewers, *Watersheds(Basins).
Identifiers: *Czechoslovakia.

The rain intensity distribution with respect to time was studied on the basis of systematic pluviographic recordings conducted in Prague, Brno, and Pilsen for the estimation of the storage capacity of sewer networks, i.e., of the sewer load prevailing prior to the main rain period. Studies of rain profile, characteristic of the Elba watershed area in Czechoslovakia revealed high rain peak in the first half of the rainfall period as the basic type of rain, and equal frequency of rains with regular and irregular intensity distribution. All heavy rains were subdivided into an inital, a main, and a final period. The initial rain period, suitable for calculations in the dimensioning of sewer systems, has the same duration as the main rain does, and has an average intensity amounting to 25 percent of that of the main rain. Runoff was most intense at the end of the main rain period. (Takacs-FIRL)
W75-02866

INSERTED PIPE REPAIRS OUTFALL IN 3 1/2 DAYS.
For primary bibliographic entry see Field 8G.
W75-02868

WATER FACTORY 21,
Orange County Water District, Fountain Valley, Calif. Board of Directors.
C. R. Chandler.
National Water Supply Improvement Association Journal, Vol 1, No 1, p 23-30, July, 1974. 6 fig, 2 tab, 5 ref.

Descriptors: *Water reuse, *Desalination, Groundwater recharge, *Water quality control, *Waste water treatment, Water management(Applied), Groundwater resources, Design, Construction, *California, *Treatment facilities.
Identifiers: *Fountain Valley(Calif).

The Orange County Water District is constructing an advanced fresh water factory called Water Factory 21 in Fountain Valley, California. It is a combination waste water reclamation plant and desalting module with an ultimate capacity of 30 mgd of high quality domestic water. The Water Factory is part of a massive hydraulic barrier project initiated to prevent further intrusion of seawater into the groundwater basin in Orange County. The water produced will be injected into the groundwater basin for replenishment and will act as a deterrent to seawater intrusion. The injected water develops an underground hydraulic pressure mound and creates a false fullness to the groundwater basin. Deep well water, imported water, reclaimed waste water, and desalted seawater were evaluated as potential sources of water for the injection program. The source of water adopted is a combination of half reclaimed waste water and half desalted seawater. Reasons for choosing this combination include: the reduction of 15,000 acre feet of waste discharge to the ocean annually; the reduction of dependency on northern California and Colorado River water supplies; and, the addition of ocean brine to waste water discharge in the ocean, thereby reducing the impact on the marine environment. Water Factory 21 is providing the design, construction, and operating technological experience that is needed for the future development of water supply facilities in different areas throughout the United States. (Orr-FIRL)
W75-02874

UNGRADED GLASS TO SEWER PIPE,
Brookhaven National Lab., Upton, N.Y.
For primary bibliographic entry see Field 8G.
W75-02875

MID CALDER WATER BOARD OPENS TWO NEW TREATMENT WORKS.
For primary bibliographic entry see Field 5F.
W75-02877

AN ANALYSIS OF THE WATER BUDGET AND WASTE TREATMENT AT A MODERN DAIRY,
Mississippi State Univ., State College. Dept. of Agricultural and Biological Engineering.
J. B. Allen, J. F. Beatty, S. P. Crockett, and B. L. Arnold.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-238 289, $3.75 in paper copy, $2.25 in microfiche. Paper No 74-4038 presented at the 1974 Annual Meeting American Society of Agricultural Engineers, Oklahoma State University, Stillwater, June 23-26, 1974. 29 p, 15 fig, 3 tab, 7 ref. OWRR A-065-MISS(2).

Descriptors: *Waste water treatment, *Farm lagoons, *Dairy industry, *Oxidation lagoons, Biochemical oxygen demand, Aerobic treatment,

Aerobic conditions, Anaerobic conditions, Lagoons, Farm wastes, Water utilization, *Mississippi.

Water usage and efficiency of a 2-cell lagoon waste treatment system was evaluated for a modern cow diairy at Holly Springs, Mississippi. The data collection period was from June 15, 1972, through June 15, 1973. Water usage was determined by water meters installed on the main supply line, the alley flushing system, the milking parlor flush tanks, the prep stalls, the milk-room, and the waterers. An average of 114 cows were milked during the study period and the average quarterly water usage ranged from 15,937 to 18,296 gallons per day (gpd) and averaged 16,738 gpd. Amounts of water used in various components of the dairy were: alley flushing systems, 5372 gpd; milking parlor flush tanks, 6869 gpd; prep stalls, 809 gpd; milk-room hot water, 320 gpd; cattle waterers, 2113 gpd; and miscellaneous, 1255 gpd. Operating efficiencies of the anaerobic (cell 1) and aerobic (cell 2) lagoons were determined by periodic chemical and microbiological analysis. The BOD of the milking parlor wastes entering cell 1 averaged 699 mg/l and the BOD of the free stall alley wastes entering cell 1 averaged 758 mg/l. The BOD of cell 1 ranged from 95 to 517 mg/l, with an average of 269 mg/l. For cell 2 the BOD varied from 46 to 206 mg/l with an average of 98 mg/l. Overall treatment efficiency of cell 1 (reduction in BOD) was 62.9%. Combined overall treatment efficiency of cells 1 and 2 was 86.5%. (Humphreys-ISWS)
W75-02879

OZONE AND CHLORINE DEGRADATION OF WASTEWATER POLLUTANTS,
Vermont Univ., Burlington. Water Resources Research Center.
J. Stoveken, and T. Sproston.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-238 365, $3.25 in paper copy, $2.25 in microfiche. Completion Report, June 1974. 6 p, 1 tab, 3 ref. OWRT A-017-VT(1). 14-31-1-4046.

Descriptors: *Ozone, *Chlorine, *Organic compounds, Pollutants, Fatty acids, Amino acids, Bacteria, Oxidation, Pollutant identification, Chromatography, Spectrophotometry, Degradation(Decomposition), *Waste water treatment.

An attempt was made to compare the effectiveness of chlorination and ozonation on the removal of a variety of organic compounds from solutions. Both ozone and chlorine concentrations were measured utilizing the orthotolidine-manganese sulfate (OTM) method, concentrations were measured spectrophotometrically, and thin-layer and gas-liquid chromatography were used to evaluate oxidation products and concentrations. Both chlorine and ozone are effective but vary greatly in their activity and specific reactions. Chlorine at 3 times conc. was not effective against amino acid proline, p. dioxane, diphenylamine, guanidine, n-hexane, phenol, and pyridine. Ozone was very destructive to the fatty acids levulinic, linoleic and oleic acids. This explains a part of ozone germicidal activity.
W75-02895

MEASUREMENT OF THE ADSORPTION OF 14C-POLYETHYLENEIMINE POLYMERS DURING FLOCCULATION OF SILICA, BACTERIA AND ALGAE,
Connecticut Univ., Storrs. Inst. of Water Resources.
J. K. Dixon, R. C. Tilton, and J. Murphy.
Water Research, Vol 8, p 659-665, 1974. 2 fig, 2 tab, 11 ref. OWRR A-031-CONN(3). OWRR 14-31-0001-3207.

Descriptors: *Flocculation, *Adsorption, *Polymers, *Silica, *Bacteria, *Algae, *Colloids, *Waste water treatment, E. coli, Chlorella, Cations, Anions, Pollutant identification.
Identifiers: 14C-Polyethyleneimine, Biocolloids, Biopolymers.

14C-Polyethyleneimine polymers of two different molecular weights have been prepared. These polymers have been used to study the flocculation of silica in water, of the bacterium E. coli in its nutrient and over a range of polymer concentration from about 1 to 1000 ppm. The degree of flocculation, and the amounts of polymer adsorbed on the colloid surface and the corresponding equilibrium concentration of polymer in solution have been measured. The concentration of polymer added to produce flocculation increased in the ratio from 1:30:500 in comparing silica, E. coli and C. ellipsoidia, respectively. However, the amount of polymer adsorbed on the same three colloids labelled with the tagged polymer, increased in the ratio 1:10:20 under comparable conditions. The higher concentrations needed to flocculate the two biocolloids cannot, therefore, be attributed to lack of adsorbed polymer on the surface. Much higher concentrations of polymer were needed on the surface to reverse the charge on the biocolloids compared with silica in order that flocculation might occur. The results are discussed briefly especially in relation to the need to explain flocculation phenomena in terms of the surface areas of the colloids and surface coverage by the polymers. Experimental results are reported which indicate that interaction of PEI polymers with anions in the algal and E. coli nutrients, and with biopolymers formed in the growth of the latter are important in affecting flocculation. (de Lara-Connecticut)
W75-02913

METHOD AND APPARATUS FOR REMOVING WATER SOLUBLE WASTES OR SALTS FROM AN AQUEOUS SOLUTION,
For primary bibliographic entry see Field 3A.
W75-02932

FLOATING CHEMICAL FEEDING AND CHEMICAL PROCESS PLANT FOR WATER PURIFICATION,
D. F. Cook.
US Patent No 3,833,122, 4 p, 7 fig, 11 ref; Official Gazette of the United States Patent Office, Vol 926, No 1, p 119, September 3, 1974.

Descriptors: *Patents, Pollution abatement, *Water purification, *Water treatment, Water pollution control, Water quality control, Equipment, Flocculation, Weirs, Sludges, *Waste water treatment.
Identifiers: *Chemical treatment.

A chemical process plant for water purification and a pure water storage tank are provided which may be floated in a river, lake, reservoir or other body of water which serves as the source of supply. Each structure is comprised of a flotation collar with a rigid support frame and an enclosure made of lightweight, relatively inexpensive materials such as flexible fiberglass reinforced plastics. Raw water enters the structure by means of openings in the end wall and flows into a chamber where a lime slurry and air are introduced. As the water continues to flow through the flocculation chamber it is diverted downward by a panel where it enters the bottom of the settling chamber. Water leaves the settling chamber by way of overflow weirs. Sludge ports facilitate removal of sludge and other products associated with the purification process. (Sinha-OEIS)
W75-02933

POLLUTION ABATEMENT THROUGH SEWER SYSTEM CONTROL,
Dayton Dept. of Water, Ohio.
W. T. Eiffert, and P. J. Fleming.
Journal Water Pollution Control Federation, Vol 41, No 2, Part 1, p 285-291, February 1969.

Descriptors: *Water pollution, *Pollution sources, *Waste water treatment, *Pollution abatement, Effluent, Municipal wastes, Industrial wastes, Water quality control, Waste water disposal, Contaminants, Water law, Environmental sanitation, Rivers, Water resources development, *Ohio, Water quality standards, Enforcement, Environmental effects, Treatment facilities, Storm sewage, Overflow, Combined sewers, Sewage treatment.
Identifiers: *State policy, *Effluent limitation.

Dayton, Ohio, is the world leader in the production of many commodities. Since the early period of the city's history, there has been an impressive diversity of industrial development. About 40 percent of the city's industries are served by the Dayton sewer system. Dayton is one of the Miami River's largest contributors of wastewater. Although more than 90 percent of the domestic and industrial organic wastewater load is tributary to the Dayton treatment plant, some wastes do escape to the river through the storm sewers. The amount of untreated wastes reaching the river has been reduced by the elimination of combined storm and sanitary sewers, by construction of sanitary relief sewers where overloads existed, and by construction of sewer system extensions to reach unsewered areas. The city's program for eliminating contaminants in storm sewers consists of identification of sewers and effluent discharges and an identification of specific sources of the contamination. Steps will be taken to eliminate sanitary sewer bypasses to storm sewers. (Proctor-Florida)
W75-02955

PRETREATMENT STANDARDS,
For primary bibliographic entry see Field 5G.
W75-02961

LAND DISPOSAL OF WASTEWATER WITH SPRAY IRRIGATION BY SMALL MICHIGAN MUNICIPALITIES - AGRICULTURAL, INSTITUTIONAL, AND FINANCIAL CHARACTERISTICS,
Michigan State Univ., East Lansing. Dept. of Agricultural Economics; and Michigan State Univ., East Lansing. Dept. of Resources Development.
L. W. Libby, D. G. Lewis, and L. J. Connor.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 364, $5.25 in paper copy, $2.25 in microfiche. Completion Report, Institute of Water Research, Michigan State University, October 1974. 108 p, 4 fig, 3 tab, 15 ref, 7 append. OWRT A-072-MICH(1). 14-31-0001-4022.

Descriptors: *Waste water disposal, Irrigation, Agriculture, Institutions, Financing, Recycling, Grants, *Michigan, Federal Water Pollution Control Act, *Water reuse, Alternative planning, Alternative costs.
Identifiers: *Land disposal, *Spray irrigation.

While exhaustive research has been undertaken on the biological, chemical, and hydrological implications of land disposal technology for waste water, very little attention has been devoted to the important institutional questions. This study examines the financial, institutional, and agricultural characteristics of land disposal projects undertaken by small municipalities in Michigan. The important choices to be made by the municipality considering such a project are emphasized. Alternatives for organizing, financing, and operating spray irrigation land disposal systems in Michigan are investigated. Data for 16 such local systems are summarized. Projects had a design population range of from 1000 to 9000 people, disposal site of 40 to 450 acres, and mean application rate of 2.5u per week, variable by soil type. Three Case studies provide in depth examination of 'on the ground' problems faced by specific communities attempting to meet water quality standards by the 'living filter'

method. Each community must deal with a unique political and physical environment in devising waste treatment programs that are acceptable locally, and yet meet required standards. The Appendix includes sample contracts for county-village and county-city cooperation, articles of incorporation for a local authority, sample leases for sharing land rights with farmers where crop production is part of the irrigation project, details of appropriate Michigan water laws, and alternative funding arrangements.
W75-02982

AEROBIC TREATMENT OF FARM WASTES,
New Zealand Agricultural Engineering Inst., Lincoln.
D. J. Hills.
New Zealand Journal of Agriculture, Vol 128, No 4, p 42-44, April 1974. 3 fig.

Descriptors: *Agricultural wastes, *Waste disposal, *Anaerobic treatment, *Aerobic treatment, Lagoons, Odors, Oxidation, Activated sludge, Municipal waters, Livestock, Aerated lagoons, Legislation, Oxidation lagoons.
Identifiers: *New Zealand, Oxidation ditches, Piggeries.

Since the Water and Soil Conservation Amendment Act of 1971, farmers have had to consider alternative treatment methods of their wastes, particularly livestock wastes. The most widely used waste disposal systems in New Zealand were anaerobic lagoons and spray disposal. However, in situations where these methods cause odors or aggravate poor soil characteristics, aerobic treatment must be considered. Oxidation ditches and mechanically aerated lagoons are both modified forms of the municipal activated sludge treatment process. This may be applied to beef cattle and poultry wastes but is especially usful in piggeries. Mechanically aerated lagoons also may be used in New Zealand in the future. Surface aeration is of value as a means for odor control of wastes which will be subsequently spread on land. Various agricultural operations are noted, with their specific problems. These include piggeries, dairy sheds, beed cattle feedlots, poultry houses, and livestock. (Prague-FIRL)
W75-02994

EVALUATION OF THE ACTIVATED SLUDGE QUALITY WITH RESPECT TO THE TECHNOLOGY OF WASTE WATER TREATMENT, (AZ ELEVENISZAP-MINOSEG ERTEKELESE TISZTITAS-TECHNOLOGIAI SZEMPONTBOL),
C. Mihaly.
Hidrologiai Kozlony, Vol 53, No 9-10, p 406-417, September-October 1973. 16 ref.

Descriptors: *Activated sludge, Municipal wastes, *Treatment methods, Domestic wastes, Effluents, *Biological treatment, *Waste water treatment.
Identifiers: *Hungary.

A systematic analysis of activated sludge quality data obtained for biological wastewater treatment plants in Hungary shows persistent impairment of the quality of the activated sludge during the last several years. The findings also show the great influence of the quality of the activated sludge on the quality and nature of the wastewater. Wastewater treatment plants handling typical domestic effluents feature activated sludge concentrations of 6-7 g/liter in the recirculation, and 3-3.5 g/liter in the aeration tank at 100 percent recirculation. The corresponding values were found to be 10-12 g/liter and 5-6 g/liter in municipal wastewater treatment plants handling also inorganic, mostly industrial, effluents. In industrial wastewaters with high organic loads, e.g., such as those generated by dairies and other food processing industries, sludge with poor settleability is obtained even with normal specific sludge loads, which considerably reduces the sludge concentration, and requires increased aeration tank volume if the necessary purification efficiency is to be maintained. As the prescribed sludge concentration of four g/liter in oxidation ditches is reached only exceptionally, a lower value of three g/liter is recommended for design purposes. The settling of sludges with poor settleability can be increased through increasing the settling time, or by means of adequate sludge thickening facilities. (Takacs-FIRL)
W75-02995

ION EXCHANGE PURIFICATION PLANT--ESPECIALLY FOR REMOVAL OF ANIMAL AND VEGETABLE MATTER FROM SEWAGE.
Belgian Patent 808,402. Issued October 1, 1973.
Belgian Patents, Food, Disinfectants, Detergents (451), p 3, January 24, 1974.

Descriptors: *Ion exchange, *Waste water treatment, *Treatment methods, Waste water(Pollution), Liquid wastes, *Sewage, *Cellulose, Municipal wastes, *Patents.

The purification of liquids by an ion exchange process particularly adaptable for removing animal and vegetable matter from sewage is described. The liquid to be purified is mixed thoroughly by a variety of mechanical methods in one or more treatment tanks in series and/or parallel with granulated (50-100 H. S. S. mesh size) activated regenerated cellulose or cellulose derivative material. The ion exchange process extracts the unwanted impurities from the liquid which is then separated by a variety of methods from the ion exchanger material which is exhausted, and at the same time, laden with the impurities. Some of those impurities are then stripped out of the exchanger material by regeneration using the same activate as that used initially. The regenerated ion exchanger wholly or partially is fed back into the plant for reuse after being flushed through. (Merritt-FIRL)
W75-02996

SEWAGE PHOSPHATES EXTRACTION--USING ACTIVATED SLUDGE.
Biospherics, Inc., Rockville, Md.
Netherlands Patent 7,207,517. Issued December 4, 1973. Netherlands Patents, Food Disinfectants, Detergents (451), p 1, January 24, 1974.

Descriptors: *Sewage, *Phosphates, *Activated sludge, *Recycling, Precipitation, Sedimentation, Biochemical oxygen demand, Effluent, *Patents, *Waste water treatment.

A process for the extraction of sewage phosphates using activated sludge is described. Raw sewage is passed through a presedimentation tank and then mixed with activated sludge. The resultant slurry is stored in an aeration tank for 1-8 hours where the micro-organisms in the activated sludge digest the phosphates. Some are absorbed into the sludge, while insoluble particles are precipitated. The slurry is then passed to a sedimentation tank where the sludge with digested and precipitated phosphates is fed to a stripping tank into which a stoichiometric quantity of phosphate stripping and dissolving agents is fed so that the sludge can be recycled. The effluent from the final separator can be passed on for subsequent treatment and has significantly reduced BOD. (Merritt-FIRL)
W75-02997

DETERMINATION OF THE RAIN RUNOFF WITH SPECIAL REGARD TO THE RUNOFF FROM INDIVIDUAL PLOTS. PART 2: APPLICATION OF ASSUMED RAIN DURATION TO SMALL AREAS--METHOD OF SUMMATION OF RUNOFF LINES--STORAGE CAPACITY IN MIXED RAINWATER SEWERS, (IN GERMAN),
For primary bibliographic entry see Field 2A.
W75-02998

WATER QUALITY FOR POTABLE REUSE OF WASTEWATER,
Dallas Water Reclamation Research Center, Tex.
H. W. Wolfe, and S. E. Esmond.
Water and Sewage Works, Vol 121, No 2, p 48-50, February 1974. 6 fig, 21 ref. OWRT B-146-TEX(2).

Descriptors: *Sodium, *Water reuse, *Water quality standards, *Potable water, *Public health, *Texas, Domestic water, Water utilization, Desalination, Waste water, Effluents, Sewage, Waste treatment, *Waste water treatment, Water chemistry, Water analysis, Water requirements, Water supply, Water treatment.
Identifiers: *Dallas(Texas), *Heart disease, Polynuclear aromatic hydrocarbons.

It seems likely that highly treated wastewater will be reused for drinking purposes, but health officials see many unanswered questions about the safety of existing water supplies. Treated wastewater is evaluated by Public Health Service Drinking Water Standards even though sewage is excluded as a source water. Sewage contains hazardous materials for which no criteria exist, such as sodium and polynuclear aromatic hydrocarbons known to be carcinogenic in animals. Studies show that high sodium content in drinking water relates to high heart disease mortality rates, and during a drought in the Southwest in the 1950's when a saline water supply was imported, heart disease mortality increased. Dallas and an unnamed control city were studied to verify this example; results support limiting sodium concentrations in water. Other factors associated with water hardness, such as total dissolved solids, high pH and increasing alkalinity, also correlate, so one can speculate if these factors are manifestations of the sodium concentration or of sodium-calcium interactions. Increased jeopardy is predicted for many people with a drinking water sodium content over 110 mg/l. The 250 mg/l limitation proposed in EPA's impending drinking water standards requires re-examination. (Grden-North Carolina)
W75-03008

LIVESTOCK WASTE MANAGEMENT SYSTEM DESIGN CONFERENCE FOR CONSULTING AND SCS ENGINEERS.
Proceedings of Conference, held at Lincoln, Nebraska, February 15-16, 1973. 303 p.

Descriptors: *Livestock, *Design, *Design criteria, *Engineering, Legal aspects, *Farm wastes, Waste storage, *Waste treatment, Waste disposal, Agricultural runoff, *Management.
Identifiers: *Waste management.

This conference was conducted in order to bring together those concerned with feedlot regulation and management. Of particular concern was waste management design for waste storage, treatment and disposal systems. Actual USDA-SCS guides drawn to Nebraska engineering standards and specifications for livestock-waste control were included. (See W75-03011 thru W75-03018) (Marquard-East Central)
W75-03010

RULES AND REGULATIONS PERTAINING TO LIVESTOCK WASTE CONTROL,
Presented at Livestock Waste Management System Design Conference for Consulting and SCS Engineers, Lincoln, Nebraska, February 15-16, 1973. 13 p.

Descriptors: *Regulation, *Legal aspects, *Livestock, *Waste treatment, *Waste disposal, *Nebraska, *Farm wastes, Permits, Groundwater, Water pollution.
Identifiers: Registered municipal wells.

Nebraska rules and regulations concerning livestock waste control are delineated. Pertinent terms are defined; permit requirements are outlined; and requirements for livestock waste con-

trol facilities are given. A list of the registered municipal wells in Nebraska is included. Also listed are the towns that have been issued permits to withdraw and use groundwater. (See also W75-03010) (Marquard-East Central)
W75-03011

HYDROLOGIC AND HYDRAULIC CONSIDERATIONS FOR DESIGN OF LIVESTOCK WASTE MANAGEMENT SYSTEMS,
Agricultural Research Service, Lincoln, Neb.
N. P. Swanson.
Presented at Livestock Waste Management System Design Conference for Consulting and SCS Engineers, Lincoln, Nebraska, February 15-16, 1973. 18 p, 2 fig, 1 tab, 26 ref.

Descriptors: *Livestock, *Design, *Farm wastes, *Agricultural runoff, Feed lots, Waste storage, Odor, Terracing, Nitrates, Rain, Slope, Solid wastes, *Nebraska, *Farm wastes.
Identifiers: *Waste management systems.

Hydrologic factors which are pertinent to potential pollution from feedlots are discussed. Experiments with a rainfall simulator produced solids losses as high as 10.7 and 27.9 tons per acre foot of runoff on an 8.5 percent slope. 13% slopes produced as high as 40.5 to 66 tons of solids per acre foot. Snowmelt causes a higher concentration of suspended solids. Solids transported by runoff and collected in a holding pond pose three problems: (1) pond storage capacity is reduced (2) emptying the pond by pumping is more difficult and (3) accumulation of solids causes odors. These problems may be overcome by terracing and lowering of slope. (See also W75-03010) (Marquard-East Central)
W75-03012

FEEDLOT RUNOFF CONTROL SYSTEM DESIGN AND INSTALLATION - A CASE STUDY,
Agricultural Research Service, Lincoln, Nebr.
C. B. Gilbertson, and J. A. Nienaber.
Presented at Livestock Waste Management System Design Conference for Consulting and SCS Engineers, Lincoln, Nebraska, February 15-16, 1973. 16 p, 4 fig, 3 tab, 19 ref.

Descriptors: *Agricultural runoff, *Feed lots, *Control systems, *Design, *Installation, Water pollution, *Farm wastes, Cattle, Waste treatment, Waste storage, Waste disposal, Continuous flow, Settling basins, Solid wastes, *Nebraska.
Identifiers: *Debris basin, *Holding pond, Settleable solids.

A case study was made for the design and installation of a debris basin, holding pond and disposal area for controlling runoff from a 1000-head beef feedlot. Design equations were formulated. The continuous flow system removed solids successfully in the debris basin. Solids transported by snowmelt and rainfall were 2.6 and 1.8 tons per acre respectively. The debris basin removed 50% of these solids. Problems of wood board swelling developed with the discharge control from the debris basin to the holding pond. The use of tile will prevent this problem. It is recommended that the holding pond capacity be increased to 100% of the ten-year twenty-four hour storm when the feedlot represents a high pollution threat to the surrounding area. (See also W75-03010) (Marquard-East Central)
W75-03013

SPRINKLER APPLICATION OF LIQUID WASTES FROM HOLDING PONDS,
H. Wittmuss.
Presented at Livestock Waste Management System Design Conference for Consulting and SCS Engineers, Lincoln, Nebraska, February 15-16, 1973. 7 p, 4 tab.

Descriptors: *Waste disposal, *Liquid wastes, Chemical properties, Nitrogen, Effluent, Cattle, Feed lots, Fertilizers, Phosphorus, *Nebraska, *Farm wastes.
Identifiers: *Holding ponds, *Sprinkler applications, Chlorine.

A research study concerning disposal of liquid wastes was conducted at Nebraska's Mead Field Laboratory. The study included three replications each of effluent application, fresh water application and a check (no water application) in sod planted corn. One half of each plot received 200 pounds of nitrogen fertilizer as ammonium nitrate and the other half was unfertilized. The effluent and water were applied at a graded rate from 1 inch to 3 inch applications on the same plot area. Soil moisture, soil density, soil chemical analysis, effluent analysis, deep percolate analysis, crop yield, and crop chemical analysis data were collected during the year. Results indicated that effluent could be disposed of in corn fields by sprinkler at a rate of 10 inches a year for maximum benefit from the effluent. (See also W75-03010) (Merryman-East Central)
W75-03014

HOW TO GUARD AGAINST POLLUTION FROM BEEF CATTLE FEEDLOT WASTES,
Agricultural Research Service, Lincoln, Nebr.
T. M. McCalla, and G. E. Schuman.
Presented at Livestock Waste Management System Design Conference for Consulting and SCS Engineers, Lincoln, Nebraska, February 15-16, 1973. 9 p, 4 tab, 19 ref.

Descriptors: *Farm wastes, *Cattle, *Water pollution, *Agricultural runoff, *Feed lots, Groundwater pollution, Waste treatment, Waste disposal, Nitrogen, Odor, *Nebraska, *Farm wastes.
Identifiers: Effluent application, Waste management.

Factors involved in water pollution from feedlots are described. A literature survey covers the topics of runoff, groundwater pollution, effluent application, feedlot management, odors, land utilization, housed feedlots and microbial pollution. No matter what waste management design is used, management of the system is the key factor. The less maintenance or attention required by the feeder, the better. (See also W75-03010) (Marquard-East Central)
W75-03015

DAIRY AND SWINE WASTE SYSTEMS,
E. A. Olson.
Presented at Livestock Waste Management System Design Conference for Consulting and SCS Engineers, Lincoln, Nebraska, February 15-16, 1973. 6 p, 3 fig.

Descriptors: *Farm wastes, *Dairy industry, Cattle, Hogs, *Waste treatment, *Waste disposal, Septic tanks, Agricultural runoff, Design, Design criteria, *Nebraska.
Identifiers: Waste systems, *Waste management, Holding ponds.

Three systems are described for handling dairy wastes. System A takes milkroom and toilet wastes to an aerobic lagoon. The lagoon size should be five feet deep and have 50-60 square feet of surface area per cow. A holding pond is used to collect runoff from the lot. In system B, all wastes except washroom and toilet go to a holding pond. The holding pond is emptied as required. The washroom and toilet wastes go to a septic tank followed by field disposal. System C is the same as B except it replaces the holding pond with a closed storage tank which has a 120 day storage capacity. Regardless of disposal method, the dairyman must have plans approved by the Nebraska Department of Agriculture's Bureau of Dairies and Foods to keep a Grade A dairy standing. Swine wastes can be handled in the same manner. Holding pond capacity should be 34.5 cubic feet per hog. (See also W75-03010) (Marquard-East Central)
W75-03016

LIVESTOCK WASTE MANAGEMENT SYSTEMS - MANAGEMENT AND MAINTENANCE DESIGN CONSIDERATIONS,
Agricultural Research Service, Lincoln, Nebr.
N. P. Swanson, and L. G. Jackson.
Presented at Livestock Waste Management System Design Conference for Consulting and SCS Engineers, Lincoln, Nebraska, February 15-16, 1973. 6 p.

Descriptors: *Livestock, *Cattle, *Management, *Maintenance, *Design, *Feed lots, Agricultural runoff, Solid wastes, Liquid wastes, Irrigation systems, *Nebraska, Waste storage, Waste treatment, Waste disposal, Effluents.
Identifiers: *Waste management, Pollution.

In order to properly maintain a feedlot, one must include planning for emergencies. There should be a means of feeding the cattle and cleaning the feedlot during inclement weather. The feedlot holding pond should have enough capacity to hold a 10-year storm. For solid waste management, land application of manure is an acceptable practice. Application rates should be based on soils, crops, and cultural practices. 1.5 tons of manure per animal per year can be expected. Mounding may be used to dispose of solids and to improve bedding areas for cattle. Debris basins provide solid waste storage, but must be cleaned when accumulations reach 6 to 8 inches. For liquid waste disposal, irrigation is the only method now recommended in Nebraska. 10 inches of runoff per year can be expected in Nebraska and may be applied by flooding, furrow or sprinkler irrigation. (See also W75-03010) (Marquard-East Central)
W75-03017

TYPICAL AND UNIQUE DISPOSAL SYSTEMS SURFACE DRAINAGE FOR A LEVEL FEEDLOT,
Agricultural Research Service, Lincoln, Nebr.
N. P. Swanson.
Presented at Livestock Waste Management System Design Conference for Consulting and SCS Engineers, Lincoln, Nebraska, February 15-16, 1973. 2 p, 1 fig.

Descriptors: *Farm wastes, *Waste disposal, *Feed lots, *Surface drainage, Agricultural runoff, Slopes, Groundwater pollution, Waste storage, Drainage, Basins, *Nebraska.
Identifiers: Mounding.

Surface drainage on a level feedlot is a constant problem. Manure accummulations at a Platte River valley farm had reached 12 to 15 inches and was causing problems. To solve, the problem, mounds were constructed and a moderate slope was built into drainways between the mounds. The drainage was passed on to three shallow basins which were connected by underground lines to a sump. To avoid possible groundwater pollution, the runoff was pumped from the sump to an underground polyethylene-lined holding pond. Heavy rains in the summer of 1972 and a wet winter have proven the value of this drainage system. (See also W75-03010) (Marquard-East Central)
W75-03018

DEMONSTRATION OF WASTE FLOW REDUCTION FROM HOUSEHOLDS,
General Dynamics Corp., Groton, Conn. Electric Boat Div.
S. Cohen, and H. Wallman.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-236 904, $5.25 in PC, $2.25 in MF. Environmental Protection Agency, Technology Series, Report EPA-670/2-74-071, September 1974. 102 p, 28 fig, 29 tab, 12 ref. 1BB033; ROAP 21 ASW; Task 010A. 68-01-0041; Project 11010 GXJ.

V 8 6 M R 1 5 7 5 UMI

Descriptors: *Water conservation, Water reuse, Sewage treatment, Filtration, Disinfection, Cost analysis, Waste water treatment, Domestic wastes, Performance, Water requirements, Water utilization, Recycling.
Identifiers: *Sewage flow reduction, *Home water reuse, Plumbing fixtures, Showers, Toilets, Lawn watering.

A two-year demonstration program was conducted to evaluate water savings, costs, performance and acceptability of various water-saving devices. Reduced flow toilets and flow limiting shower heads were installed in eight single-family dwellings. In three of the homes bath and laundry water was filtered, disinfected, and reused for toilet flushing and/or lawn sprinkling. The experimental portion of the program ran from May 1971 to May 1973. Water requirements for toilet flushing were substantially reduced in an economically attractive and aesthetically acceptable manner. Shallow trap and dual-flush toilets resulted in average decreases in toilet water usage of 25% and 23%, respectively. Flow restricting shower heads proved to be relatively ineffective, however this result may have been due to use patterns unique to this study. Wash water recycle systems provided satisfactory operation throughout the test period. The average savings for toilet flushing reuse ranged between 23% and 26% of total water usage. The incorporation of lawn sprinkling as a supplemental reuse mode further reduced waste flow from homes by 16% to 18%. For single-family dwellings, recycle systems could effect marginal cost savings in high water and sewer use rate areas. They are definitely warranted when septic systems with poor drainage (due to soil or topography) are encountered. (EPA)
W75-03021

RELATIONSHIP BETWEEN DIAMETER AND HEIGHT FOR THE DESIGN OF A SWIRL CONCENTRATOR AS A COMBINED SEWER OVERFLOW REGULATOR,
American Public Works Association, Chicago, Ill.
R. H. Sullivan, M. M. Cohn, J. E. Ure, F. E. Parkinson, and G. Galiana.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-234 646, $4.25 in PC, $2.25 in MF. Environmental Protection Agency, Technology Series, Report EPA-670/2-74-039, July 1974. 1BB034/ROAP 21ATA/TASK 31. 68-03-0283.

Descriptors: *Overflows, Design, *Combined sewers, *Flow control, *Flow regulators, Flow rate, *Swirling--separation, *Water treatment, *Waste treatment.
Identifiers: *Solids separation, *Swirl concentrator, Overflow quantity, Overflow quality.

This report is a supplement to the report, The Swirl Concentrator as a Combined Sewer Overflow Regulator Facility, EPA-R2-72-008, September, 1972 (See W72-05214). The work described by this report allows flexibility for the designer faced with structural, head or land area constraints by enabling interchange of basic heights and diameter dimensions. Studies of The Swirl Concentrator as a Combined Sewer Overflow Regulator Facility, conducted in 1972 by the American Public Works Association Research Foundation for the City of Lancaster, Pennsylvania, and the U. S. Environmental Protection Agency, demonstrated that this type of dynamic flow, non-mechanical device could effect excellent removals of suspended and floatable solids contained in admixtures of sanitary sewage and storm water. This improvement in the quality of storm flow discharges to receiving waters, or to treatment or storage facilities could reduce the pollutional impact on the nation's water resources. The 1972 studies established a suitable relationship between swirl chamber depth and diameter and their effect on the liquid flowfield and particle removal efficiencies. It was deemed advisable to augment the 1972 studies by investigating this depth-to-width ratio and to define the dimensions which will provide optimum construction economy and operating efficiency in terms of solids separation. This report presents an account of these supplemental studies of a hydraulic model of the swirl concentrator at the LaSalle Hydraulics Laboratory at Montreal. The report translates the model study findings into a design basis that can be used for any rational flow rate in universal service for the treatment of combined sewer flows. It establishes the basic principle that variations in overflow weir height, or chamber depth, do not materially influence solids particle removals and that the most definitive design parameters are size of inlet sewer and swirl chamber diameter. While the model studies showed that a ratio to weir height to chamber diameter of 1:4 was the most convenient to use as a design aid, the data have been extrapolated to produce geometry modification curves that cover swirl chamber diameters and depths. This information will be of value in the design of facilities which are the most economical and efficient. The report provides design curves for various influent flow rates, covering chamber diameters and inlet sewer sizes which will produce settleable solids removal efficiencies of 70, 80 and 90 percent. It presents design details for floatable solids traps to retain these components, and for essential details of swirl chamber geometrics. Procedures are outlined on how the model study curves can be used in the design of prototype swirl concentrator units of various capacities and dimensional relationships. (EPA)
W75-03022

POLLUTION CONTROL--NOW AND IN THE FUTURE,
Purdue Univ., Lafayette, Ind. School of Civil Engineering.
J. E. Etzel.
In: Biological Effects in the Hydrological Cycle, Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana. p 51-58. 1 fig, 8 tab, 3 ref.

Descriptors: *Water pollution control, *Waste water treatment, Municipal wastes, Industrial wastes, Water quality, Tertiary treatment, Electrodialysis, Ion exchange, Reverse osmosis, Costs, Estimated costs, Water pollution control.

The only wastewaters receiving treatment today are those from municipal and industrial discharges. Treatment schemes for agricultural wastewaters from confined feeding operations are just beginning to eliminate any discharge to streams. Land runoff with its nutrient and sediment problems is virtually uncontrolled with treatment not even contemplated at present. The relative importance of each of these sources of pollution to the overall environment is important, but when viewed from the public's concern over pollution, only those of industry and the municipality are getting more than a limited amount of effort. First generation advanced wastewater treatment (AWT) processes now being considered for full scale installations are microscreening, lime clarification, multi-media filtration, ammonia stripping, granular carbon absorption, and recarbonation. Second generation AWT processes such as reverse osmosis, electrodialysis, and deionization are only in the early stages of pilot plant investigations. Overall operation of the total economic system between people, industry, and agriculture, and this system's dictates on the ultimate degree of cleanup of water pollution may be tempered by man's desire for an improved water environment beyond economic limits but only to a minor degree. (See also W75-03023) (Humphreys-ISWS)
W75-03028

RENOVATION OF MUNICIPAL WASTEWATER THROUGH FOREST IRRIGATION,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
W. E. Sopper.
In: Biological Effects In The Hydrological Cycle, Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana. p 275-291, 4 tab, 18 ref.

Descriptors: *Waste water disposal, *On-site investigations, Sewage disposal, Municipal wastes, Sewage effluents, Groundwater recharge, Irrigation, Forests, Vegetation, Biological treatment, Spoil banks, Vegetation establishment, Water management(Applied), Land management, Waste water treatment, Plant growth, Demonstration watersheds, Nutrient removal, *Pennsylvania.
Identifiers: *Living filter, *Biological effects.

The wastewater renovation and conservation project in Pennsylvania was described. Sewage effluent was disposed on the land by irrigation in order to utilize the entire biosystem--soil and vegetation--as a 'living filter' to renovate the effluent for groundwater recharge. Eight years of research have indicated that the living filter system for renovation and conservation of municipal wastewater is feasible and that the combinations of agronomic and forested areas provide the greatest flexibility in operation. At the recommended level of irrigation, 2 inches per week, only 129 acres of land would be required to dispose of 1 million gallons of wastewater per day. Although large contiguous blocks of agricultural and natural forest land would be the most desirable for efficiency and economy, major metropolitan areas could utilize golf courses, playing fields, forest preserves and parks, greenbelts, scenic parkways, and perhaps even divided highway and beltway median strips. Preliminary results after two years of research also indicate that municipal wastewaters might also be used to reclaim and revegetate many of the barren bituminous strip-mined spoil banks existing throughout the Appalachian region and restore them to a more esthetic and productive state. (See also W75-03023) (Humphreys-ISWS)
W75-03035

RENOVATING SEWAGE EFFLUENT BY GROUND WATER RECHARGE,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
H. Bouwer, J. C. Lance, and R. C. Rice.
In: Biological Effects In The Hydrological Cycle, Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana. p 292-302, 3 fig, 2 tab, 14 ref.

Descriptors: *Sewage effluents, *Reclaimed water, *Groundwater recharge, Irrigation, Infiltration rates, *Water reuse, Nutrients, Crops, Coliforms, Filtration, Disinfection, Furrow systems, Sprinkler irrigation, Hydrogeology, Microorganisms, Hydraulic conductivity, Wells, Water table, Biochemical oxygen demand, Chemical oxygen demand, Nitrogen, Ammonia, Nitrates, Phosphates, Fluorides, Boron, Salts, Hydrogen ion concentration, Biodegradation, Capital costs, Operating costs, *Arizona.
Identifiers: *Salt River Valley(Ariz), *Flushing Meadows Project(Ariz), Groundwater mounds.

Due to continued population growth in the Salt River Valley, Arizona, reuse of municipal wastewater becomes essential. A pilot project was installed in 1967 to determine if tertiary treatment could be obtained effectively and economically by groundwater recharge with infiltration basins in the Salt River bed. The hydrogeologic conditions are favorable for high-rate wastewater reclamation by groundwater recharge. Results indicate that the infiltration rate in grass-covered basins is 20% higher, and in a gravel-covered basin 50% lower, than in a bare soil basin. Alternating inundation periods with dry-up periods yielded maximum annual infiltration rates. Reclaimed water, pumped from the center of the recharge area, has a BOD of about 0.5 mg/liter and a median fecal coliform den-

sity of 10 per 100 ml. Nitrogen is essentially converted to nitrate in the reclaimed water following short inundation periods. To reclaim the sewage flow that is expected in the Phoenix area by the year 2000, about 900 acres of infiltration basins would be required. Cost of reclaiming water in this manner would be about $5 per acre-foot, which is less than one-tenth the cost of equivalent, in-plant tertiary treatment. (See also W75-03023) (Visocky-ISWS)
W75-03036

CATALYZED BIO-OXIDATION AND TERTIARY TREATMENT OF INTEGRATED TEXTILE WASTEWATERS,
Fram Corp., Providence, R.I.
A. J. Snyder, and T. A. Alspaugh.
Copy Available from GPO Sup Doc as EP1.23:660/2-74-039, $1.55; microfiche from NTIS Springfield, Va 22161 as PB-238 473; $2.25. Environmental Protection Agency, Technology Series report EPA-660/2-74-039, June 1974. 83 p, 34 fig, 17 tab, 2 ref. EPA Project 12090 HLO.

Descriptors: Biodegradation, Water pollution, Pollution abatement, *Textiles, *Waste water treatment, *Biological treatment, Water reuse, Color, *Tertiary treatment, Pilot plants, *Oxidation, Catalysis, Industrial wastes, Recycling, Activated carbon, Resins.
Identifiers: *Catalyzed bio-oxidation, *Alum recovery, Adsorbent resins, Color removal, Activated carbon.

This report describes the observations from preliminary studies and pilot plant operations that were initiated to upgrade the waste effluent of an integrated textile dye mill. The biological pilot plant was designed to utilize activated carbon on the basis that the presence of carbon enhances biodegradation. To meet the proposed water standards, tertiary treatment of the effluent was also necessary. Two methods of attaining better water effluent were investigated. A conventional method, the addition of an alum system, with alum recovery was added to the biological treatment system. Although the effluent quality improved, trace color remained in the supernatant. An adsorbent resin system was tested and found effective in upgrading the waste effluent to recreational standards. The results of preliminary studies and the pilot plant indicate that carbon catalysis enhances biological degradation, and satisfactory tertiary treatment can be achieved with an alum and resin system. (EPA)
W75-03049

SUBMERGED COMBUSTION EVAPORATOR FOR CONCENTRATION OF BREWERY SPENT GRAIN LIQUOR,
Anheuser-Busch, Inc., St. Louis, Mo. Engineering Dept.
J. L. Stein.
Copy Available from GPO Sup Doc as EP1.23:660/2-74-059, $1.85; microfiche from NTIS Springfield, Va 22161 as PB-238 475; $2.25. Environmental Protection Agency, Technology Series Report EPA-660/2-74-059, June 1974. 115 p, 4 fig, 8 tab, 10 ref, 11 append. EPA Project 12060 HCW.

Descriptors: *Waste water treatment, *Evaporators, *Industrial wastes, Water pollution control, Water pollution sources, Waste disposal, Wastes, Effluent streams, Biochemical oxygen demand, Design, Cost comparisons, Treatment facilities, Suspended solids.
Identifiers: Submerged combustion evaporators, *Spent grain, *Brewing wastes, Beer, Food processing, Multiple-effect evaporators, Resource recovery, Demonstration plants.

A major waste stream in many breweries is the liquor resulting from spent grains dewatering prior to drying. This liquor may account for a third or more of the B.O.D. sub 5 and suspended solids generated by a typical brewery. Initial studies of the spent grain liquor problem indicated that recovery rather than treatment was the best approach. A number of evaporators were evaluated to determine which design was most satisfactory for concentrating the liquor. A submerged combustion evaporator was selected on the basis of engineering analyses and pilot scale tests. A full scale unit was installed at the Houston Brewery of Anheuser-Busch, Inc., in 1970. This evaporator was modified several times to overcome failures of the burner downcomers brought about by high temperatures. Before a final solution to these problems could be demonstrated, the project was terminated. Fuel costs above $1.60 per million kg-cal (40 cents per million BTU) coupled with thermal efficiencies approximately 3.5 times better for conventional four-effect evaporators indicated that a conventional evaporator would be more economical at these fuel price levels. (EPA)
W75-03050

DEVELOPMENT OF A MONTHLY MUNICIPAL TECHNOLOGY BULLETIN,
Franklin Inst. Research Labs., Philadelphia, Pa.
D. A. Sandoski.
Copy available from GPO Sup Doc as EP1.23:660/2-74-005, $1.65; microfiche from NTIS, Springfield, Va. 22161, as PB-238 471; $2.25. Environmental Protection Agency, Technology Series, Report, EPA-600/2-74-005, May 1974, 126 p. EPA Grant R801628.

Descriptors: *Abstracts, *Municipal water, *Publications, *Information exchange, Documentation, Analytical techniques, Application methods, Construction materials, Control systems, Design criteria, Drainage systems, Equipment, Installation, Mathematical models, Model studies, Patents, Pipelines, Rainfall-runoff relationships, Repairing, Separation techniques, Sewage treatment, Sewers, Storm water, *Treatment facilities, *Waste water treatment, Water analysis.
Identifiers: *Indexes, *Technological advancements.

Through the joint efforts of the environmental Protection Agency and the Franklin Institute Research Laboratories, a monthly current-awareness bulletin, MUNICIPAL TECHNOLOGY BULLETIN, has been developed which emphasizes advancements in the field of municipal technology as related to water quality and water pollution control. The purpose of this publication is to inform technical researchers, governmental administrators, and consulting engineers of pertinent information appearing in over 4000 technical journals, both domestic and foreign, currently in circulation. In surveying the literature the following subject areas are explored: wastewater treatment; disposal methods; water reclamation and reuse; water quality requirements; economics of water pollution control; construction equipment and materials; analytical techniques and instrumentation; storm overflows and regulation devices; sewer systems; storm water quality, quantity, and pollution; and, tunneling technology and equipment. The 319 abstracts appearing in the 12 monthly issues are arranged numerically by abstract accession number with corresponding bibliographic citation(s). A subject index providing the necessary access to individual concepts, an author index, and an alphabetical listing of journals referenced in the Bulletin issues are included. (EPA)
W75-03051

MICROSTRAINING AND DISINFECTION OF COMBINED SEWER OVERFLOWS - PHASE III,
Crane Co., King of Prussia, Pa. Cochrane Environmental Systems Div.
M. B. Maher.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-235 771, $4.75 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Technology Series, Report EPA 670/2-74-049, August 1974. 81 p, 13 fig, 8 tab, 12 ref, 3 append. P.E. 1BB034 ROAP: 21-ASY Task: 105. EPA Project S-800966.

Descriptors: Cost comparisons, Polyelectrolytes, Water quality, *Filtration, Coagulation, Sewers, *Ozone, *Chlorine, Surface runoff, *Waste water treatment, Pennsylvania, Combined sewers, *Storm runoff, *Suspended solids, Water pollution control, *Disinfection.
Identifiers: *Microstraining, *Combined sewer overflow, High rate disinfection, Philadelphia(Penn).

A microstrainer reduced the suspended solids (SS) of the combined sewer overflow from 50 to 300 mg/l to 40 to 60 mg/l operating at an average rate of 38.4 m/hr (16 gpm/sq. ft.) Addition of polyelectrolyte improved the overall performance of the microstrainer. The effluent SS was reduced to an average of 23 mg/l and the flow rate increased to an average of 87.5 m/hr. (36 gpm/sq. ft.) The combined sewer served a residential area in Philadelphia composed of 4.5 hectares (11.2 acres). The average dry weather flow was 91 cu m/day (24,000 gpd). An extensive coagulation study revealed that cationic polyelectrolytes were most suitable for this particular application. The concentrations applied ranged from 0.25 to 1.5 mg/l. Coliform reductions across the microstrainer were observed. It was also found that microstrained effluent could be more easily disinfected than raw combined sewer overflow. Chlorine and ozone were used for disinfection at low contact times. The capital cost of a microstrainer installation followed by high rate chlorine contact chamber is reported as $60660/hectare ($24480/acre). When polyelectrolyte addition equipment is included, capital cost is $37250/hectare ($15030/acre). Costs are in 1973 dollars. (See also W73-08297 and W71-01263) (EPA)
W75-03054

COMPETITIVE BINDING OF MERCURIC CHLORIDE IN DILUTE SOLUTIONS BY WOOL AND POLYETHYLENE OR GLASS CONTAINERS,
Western Regional Research Lab., Berkeley, Calif.
For primary bibliographic entry see Field 5B.
W75-03058

ON-STREAM ATOMIC-ABSORPTION DETERMINATION OF ZINC AND MANGANESE IN FLOTATION LIQUORS CONTAINING CALCIUM SULPHATE,
Commonwealth Scientific and Industrial Research Organization, Port Melbourne (Australia). Div. of Mineral Chemistry.
For primary bibliographic entry see Field 5A.
W75-03059

DIGESTION AND DEWATERING OF PHOSPHORUS-ENRICHED SLUDGES,
Northeastern Univ., Boston, Mass.
J. C. O'Shaughnessy, J. B. Nesbitt, D. A. Long, and R. R. Kountz.
Journal Water Pollution Control Federation, Vol 46, No 8, p 1914-1926, August, 1974. 10 fig, 1 tab, 17 ref.

Descriptors: *Sludges, *Phosphorus, *Waste water treatment, *Effluents, Cations, Aluminum, Toxicity, Chemical precipitation, *Anaerobic digestion, *Sludge digestion, Dewatering.

This investigation was conducted on sludges, fed to a treatment plant digester, which included precipitates formed by the addition of sodium aluminate or alum to the waste water being treated in an activated sludge system. The objectives were: (1) to determine the effects of aluminum-phosphorus precipitate on the anaerobic digestion process; (2) to determine the identity of different forms of phosphorus and the effects of anaerobic

digestion on them; (3) to determine whether the excess sulfate ion, released into solution during phosphate removal with alum, increases the production of hydrogen sulfide; and (4) to determine effects of the aluminum-phosphorus precipitate on the dewatering properties of raw sludges. The data indicated that a biological sludge containing a complex aluminum phosphate precipitate can be processed in an anaerobic digester without harm to the digestion process and without the process causing any phosphorus to be returned to the liquid waste stream. A sludge that incorporated the precipitates of the chemical additives dewatered more readily than a sludge that did not include these precipitates. (Jernigan-Vanderbilt)
W75-03070

CUTTING WIRE-MILL POLLUTION,
J. C. Davis.
Chemical Engineering, p 64-66, January 8, 1973. 1 fig, 1 tab.

Descriptors: *Industrial wastes, *Pollution abatement, *Copper, Sludge, Metals, *Recycling, Zinc, Chemical precipitation, *Waste water treatment, *Waste treatment.

A new brass-wire-pickling process reduces total wastes-to-sewerage by at least 30 times, while decreasing water requirements 15 times. The process, which was developed originally by Lancey Laboratories, Inc., doesn't cost more than conventional practice and improves production. The pollutant-removal expense is offset chiefly by recovery of high purity electrolytic copper and an up-to fifteenfold reduction in rinse water. The use of continuous electrolysis for copper recovery - where previously there was no recovery of the pure metal - is made possible in part by the substitution of hydrogen peroxide for a dichromate solution in the secondary pickling step. The primary pickling solution can be recycled without fear of causing copper plating onto wire as a consequence of copper buildup in the tank. Such buildup was the main reason for periodic solution dumping. The final chemical-treatment step for the wire coils is removal of residual drag-out acids in the copper treatment reservoir. Sodium hydroxide, sodium carbonate and hydrazine are added to precipitate metallics from solution. The sludge, high in solids content, is mixed with neutralized floor spill, filtered and sold, mostly for its zinc content. (Jernigan-Vanderbilt)
W75-03073

IRON AND MANGANESE STUDIES OF NEBRASKA WATER SUPPLIES,
Nebraska Univ., Lincoln. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-03078

HYDROLOGY OF 7-DAY 10-YR LOW FLOWS,
Illinois State Water Survey, Urbana. Hydrology Section.
For primary bibliographic entry see Field 5B.
W75-03104

SEWAGE-SLUDGE AND TRANSMISSION CYCLES OF SALMONELLAE, (IN GERMAN),
Zurich Univ. (Switzerland). Veterinary Bacteriology Inst.
For primary bibliographic entry see Field 5B.
W75-03114

EXPLORATORY FIELD STUDY OF A GROUND WASTE DISPOSAL FACILITY,
Hanford Atomic Products Operation, Richland, Wash.
For primary bibliographic entry see Field 5B.
W75-03117

EVALUATION OF LIME/LIMESTONE SLUDGE DISPOSAL OPTIONS.
Radian Corp., Austin, Tex.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 022, $4.75 in paper copy, $2.25 in microfiche. Environmental Protection Agency Report No EPA-450/3-74-016, November 1973. 106 p, 9 fig, 6 tab, 67 ref, 4 append. EPA Contract No 68-02-0046.

Descriptors: *Air pollution, Electric powerplants, *Lime, *Limestones, Chemical reactions, Coals, Fuels, Sludge, *Sludge disposal, Drying, Stabilization, Calcium compounds, Sulfur compounds, Boilers, Settling basins, Economics, Land reclamation, Leaching, *Ohio, Waste treatment.
Identifiers: *Desulfurization, Flue gases, Ash ponds, Combustion products.

Results were presented of a study of technology for disposal of sludge created by lime and limestone flue gas desulfurization systems at steam-electric power plants. Effects of operating variables on the volume of sludge produced were explained with emphasis on plant situations in Ohio. Properties of sludges were reviewed, including settling characteristics, rewatering tendency, strength, particle size, bulk density, and chemical composition. Potential environmental hazards of sludge disposal were considered, namely contamination of water and groundwater supplies. Methods of avoiding these hazards were presented and evaluated. Technologies for solidifying (fixating) sludge were discussed and evaluated along with the current status of full-scale projects. Any large degree of commercial utilization is unlikely. Based on available data, there are no insurmountable problems in disposing of sludge in an environmentally acceptable manner. While economics of disposal are not well defined, studies are underway that should provide better cost information and other valuable information. (Visocky-ISWS)
W75-03118

AN ECOLOGICAL APPROACH TO THE PROBLEM OF BIODEGRADATION OF PHENOLIC WASTES,
Trinity Univ., San Antonio, Tex.
H. D. Cobb.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-770 750, $3.25 in paper copy, $2.25 in microfiche. August 1973. 16 p, 3 tab, 2 fig. AFOSR-72-2356.

Descriptors: *Waste water treatment, *Industrial wastes, Microbial degradation, Sampling, Microorganisms, Trickling filters, Lagoons, Drainage districts, *Texas, Water pollution sources.
Identifiers: *Cresol, Kelly Air Force Base, Drainage racks.

Results of an initial study to isolate and identify organisms associated with cresol metabolism in industrial waste waters of Kelly Air Force Base are summarized. Samples were taken from: (1) various depths in the trickling filter bed; (2) a lagoon holding excess water prior to treatment; (3) several points along drainage districts leading to the treatment plant, and (4) lower surfaces of drainage racks in the paint stripping area. Each sample was innoculated into two different standard growth media which were modified to aid in the selection for cresol tolerance. Eight of the isolates from the industrial waste water sample were shown to be capable of a rapid degradation of cresol. The preliminary data indicate that all eight break down the para isomer and that the ortho form is the most difficult to metabolize. The isolated organisms utilized the cresol as an energy source. Of the eight isolates, 'HB' showed the greatest promise. It rapidly degraded all three isomers at concentrations exceeding 900 pmm, a concentration several times greater than that presently entering the treatment plant. Presently, removal of cresol at the treatment plant through natural actions of the isolated organisms is limited. (Schroeder-Wisconsin)
W75-03125

COSTS OF HAULING AND LAND SPREADING BY DOMESTIC SEWAGE TREATMENT AND PLANT SLUDGE,
National Environmental Research Center, Cincinnati, Ohio.
W. F. McMichael.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-227 005, $3.25 in paper copy, $2.25 in microfiche. February 1974. 24 p, 10 fig, 7 ref.

Descriptors: *Sludge disposal, Waste storage, *Waste water treatment, Liquid wastes, Sludge treatment, Sewage treatment, Sanitary engineering, *Cost analysis, Operating costs, Capital costs, Maintenance costs, Labor.
Identifiers: Spreading, Dewatered sludge hauling.

Capital and operating cost estimates for hauling wet sewage sludge to disposal areas by truck and trailer tanks are estimated. The method, although more costly than other techniques, is frequently used because of its greater flexibility and applicability to more situations. Cost estimates are based on assumptions that truck drivers' salaries averages $3.97/hr; round trip hauling distances range from 10-60 miles; spreading occurs over a 195 day period; loading and unloading times average 15 minutes each; and average road speeds equal 25 miles per hour. Operating and maintenance costs, exclusive of amortization and drivers' wages for liquid sludge hauling were estimated at 40cents/mile (5500 gallon capacity vehicle); 35cents/mile (2500 gallon capacity) and 23cents/mile (1200 gallon capacity). Comparable operating and maintenance for trucks hauling dewatered sludge were 40cents/mile (22 ton capacity); 35cents/mile (10 ton capacity) and 23cents/mile (7 1/2 ton capacity). Total costs for liquid sludge disposal also include the cost of the sludge storage lagoon, vehicles, labor and interest charges based on the price of the land on which the sludge is spread. Impacts of governmental and seasonal limitations on disposal sites and truck sizes on costs are also discussed. (Schroeder-Wisconsin)
W75-03129

COSTS AND BENEFITS OF THE ABATEMENT OF POLLUTION OF BISCAYNE BAY, MIAMI, FLORIDA,
Miami Univ., Coral Gables, Fla.
For primary bibliographic entry see Field 5G.
W75-03140

STANDARDS FOR EFFLUENTS FROM FERTILIZER INDUSTRY,
Indian Standards Institution, New Delhi.
G. M. Saxena.
Indian Journal of Environmental Health, Vol 15, No 4, p 305-321, October 1973. 7 tab, 7 ref.

Descriptors: *Fertilizers, *Standards, *Effluents, Waste disposal, Industrial wastes, Surface waters, Sewers, Irrigation, *Waste water treatment, Ureas, Sulfates, Phosphates, *Water quality standards.
Identifiers: *India.

The India water quality standards prescribed for fertilizer effluents for disposal into inland surface waters onto land for irrigation, and into public sewers are discussed. A summary of select fertilizer industries with reference to characteristics of their effluents and treatment procedures adopted by them is also presented. (Sandoski-FIRL)
W75-03187

THE WATER SUPPLY INDUSTRY.
For primary bibliographic entry see Field 5F.
W75-03189

ACTIVATED SLUDGE PH SHOCK.
Effluent and Water Treatment Journal, Vol 14, No 3, p 165, March 1974.

Descriptors: *Biomass, *Effluent, *Waste water treatment, *Bacteria, *Laboratory analysis, Microorganisms, Filamentous fungi, Chemistry, Analytical techniques, *Hydrogen ion concentration, Biochemistry.
Identifiers: Bacterial-protozoan, Biochemical efficiency, Acid shock.

A study at Oklahoma State University on laboratory cultures has as its objectives to characterize the response of completely mixed activated sludge systems to pH shock in terms of biomass and effluent substrate concentrations, types of microbial populations present and chemical composition of the biomass. Guidelines were obtained for allowable pH in waste water. With severe acid shock, the population changed from bacterial-protozoan to one of filamentous fungi. Based on the results it was estimated that pH changes of no more than one unit from the neutral preshock range can be tolerated without disrupting the biochemical efficiency of substrate removal. (Prague-FIRL)
W75-03194

HINDERED SETTLING AND SLUDGE BLANKET CLARIFIERS,
New South Wales Univ., Kensington (Australia). Dept. of Public Health Engineering.
B. W. Gould.
Effluent and Water Treatment Journal, Vol 14, No 3, p 131-135, March, 1974. 2 fig, 6 ref.

Descriptors: *Waste water treatment, *Water clarification, Flow, Settling, Slurries, Fluid movement, *Water treatment.
Identifiers: *Sludge blanket clarifiers, Sludge flux intensity, Hindered settling, Slurry pool, Fluidized bed, Efficient mixing.

In the treatment of water and waste water, one common application of hindered settling is in sludge blanket, or solids-contact, clarifiers. Hindered settling, whereby the settling of any particle is hindered by other particles in the suspension, is essential to this treatment. The relationship between the sludge flux intensity, velocities, and concentration distribution was found to depend upon continuity conditions for a particular sludge. The stability of flow in fluidized beds, such as a slurry pool in a clarifier, cannot be achieved unless the incoming fluid is mixed as thoroughly and evenly as possible with the settling sediment. Thus, efficient mixing at the inlet to a sludge blanket clarifier is most necessary to obtain efficient operation. (Prague-FIRL)
W75-03196

DISPOSAL OF COMMUNITY WASTEWATER.
World Health Organization, Geneva (Switzerland).
Technical Report Series No 541, 1974. 72 p, 17 ref.

Descriptors: *Municipal wastes, *Waste disposal, *Waste water treatment, *Alternative planning, *Water reuse, Water supply, Water quality, Control, Effluents, Water resources development, Water management(Applied), Water costs, Public health, Monitoring, Water pollution.

A report of a World Health Organization Expert Committee on Disposal of Community Wastewater which met in Geneva from September 25-October 1, 1973 is presented. The committee emphasized the need for specific research activities in the following areas: alternatives to the water carriage systems; reuse of waste water; removal of deleterious substances; new criteria for the control of effluent quality; manpower and managerial development; and low cost collection and disposal systems. Master plans envisaging feasible development in stages should be established on a community basis. An effective organization should be established at the national, state, regional, or local level for the efficient management of the facilities with the emphasis on a central agency to plan and operate water supply and waste water disposal systems. The financing of waste water disposal systems should be integrated with that of water supply systems in the interest of obtaining higher priority for waste water systems and better public acceptance of them. The waste water disposal system should, as far as possible, be self-financing; government subsidies providing the initial impetus, if required. Health agencies should continue their activities in the monitoring and surveillance of water quality and environmental pollution. (Merritt-FIRL)
W75-03199

SLIME CONTROL COMPOSITIONS CONTAINING PHENOLIC COMPOUNDS AND THEIR USE,
Betz Labs., Inc., Trevose, Pa. (assignee)
R. Brink, B. F. Shema, R. L. Justice, and P. Swered.
United States Patent 3,829,305. Issued August 13, 1974. Official Gazette of the United States Patent Office, Vol 925, No 2, p 588-589, August, 1974.

Descriptors: *Patents, *Slime, *Phenols, Bacteria, Fungi, Algae, Inhibition, Water quality control, Industrial water, Pulp and paper industry, *Industrial wastes, *Waste water treatment.

Water used in pulp and paper manufacture and water used in cooling water systems and other industrial waters, provide environments which are favorable to slime formation. Slime is considered undesirable from an operational and/or an aesthetic point of view. Compositions have been patented that are useful for inhibiting and/or controlling the growth of slime in water. These mixtures exhibit synergistic activity against microorganisms, including the bacteria, fungi and algae which produce slime in aqueous systems. The growth of slime is inhibited by the biocidal action of the compounds in the mixture. The mixture is composed of phenolic compounds such as phenol, orthophenylphenol, 2,3,4,6-tetrachlorophenol, 4-chloro-2-cyclopentylphenol and 2-chloro-4-phenylphenol. (Orr-FIRL)
W75-03201

FLUID FILTER DEVICE,
Parker-Hannifin Corp., Cleveland, Ohio.
C. A. Brown.
Canadian Patent 952,440. Issued August 6, 1974. Patent Office Record, Vol 102, No 32, p 40, August, 1974.

Descriptors: *Patents, *Filters, *Filtration, *Separation techniques, *Waste water treatment, Equipment, Pressure.

A fluid filter apparatus is described. It consists of a fluid chamber with the first two inlet portions connected to a fluid inlet and an intermediate portion connected to a fluid outlet. A cylindrical filter element is in the intermediate portion; fluid flows from the inlet portions into the interior of the filter element, radially through its walls and into the intermediate portion. In response to a predetermined pressure increase in the inlet portions, the filter element moves and opens fluid communication between the inlet portions and the intermediate portion. Fluid then flows from the fluid inlet to the fluid outlet and bypasses the filter element. (Orr-FIRL)
W75-03202

METHOD AND APPARATUS FOR TREATING EFFLUENT,
Mono Pumps Ltd., London (England).
A. P. Hopwood.
Canadian Patent 952,237. Issued July 30, 1974. Patent Office Record, Vol 102, No 31, p 88, July, 1974.

Descriptors: *Patents, *Sewage treatment, *Aerobic treatment, Tubes, *Sewage effluents, Liquid wastes, *Waste water treatment, Settling basins.

A method and apparatus for treating raw effluent such as sewage are described. The effluent is sent through a vessel containing media. The media are suitably short lengths of plastic tubing. Air is passed through the effluent and media. A two stage process is possible by passing the effluent through two containers of plastic tubing. The treated effluent then goes to settlement tanks. (Orr-FIRL)
W75-03203

SEWAGE TREATMENT SYSTEM,
Koehler-Dayton, Inc., New Britain, Conn. (assignee)
A. H. Cornish, R. E. DeLaney, and R. B. Davis.
United States Patent 3,831,534. Issued August 27, 1974. Official Gazette of the United States Patent Office, Vol 925, No 4, p 1180, August, 1974. 1 fig.

Descriptors: *Patents, *Incineration, *Sewage treatment, *Burning, *Liquid wastes, Sewage effluents, *Waste water treatment.

A sewage treatment system is described. A surge tank receives the effluent from a recirculating toilet or similar structure. The effluent received by the surge tank is selectively and periodically delivered to a housing in an incinerator. The incinerator contains a combustion chamber that directs a flame down against the top surface of the sewage in the housing. The liquid part of the effluent evaporates and passes through a stack on the combustion chamber. The incinerator is turned off automatically when the level of the effluent in the housing drops to a predetermined level. (Orr-FIRL)
W75-03206

FILTER ASSEMBLY,
Everpure, Inc., Oak Brook, Ill.
J. W. Thomsen.
Canadian Patent 952,041. Issued July 30, 1974. Patent Office Record, Vol 102, No 31, p 43, July, 1974. 1 fig.

Descriptors: *Patents, *Filters, Equipment, *Filtration, *Waste water treatment, *Separation techniques, Valves.

A filter assembly has been patented that consists of a head with a built-in shut-off valve and is adapted to be mounted in the line supplying the fluid to be filtered. A replaceable filter unit is held by a clamping collar to the head. Interacting cam means on the clamping collar and head engage or disengage the filter unit to or from the head. (Orr-FIRL)
W75-03208

CORRUGATED DRAINAGE TUBE WITH RESTRAINING SCREEN,
Advanced Drainage Systems, Inc., Waterville, Ohio. (assignee)
M. E. Sixt.
United States Patent 3,830,372. Issued August 20, 1974. Official Gazette of the United States Patent Office, Vol 925, No 3, p 867, August, 1974. 1 fig.

Descriptors: *Patents, *Separation techniques, *Drainage, Water treatment, Tubes, Filtration, Equipment, Waste water treatment, *Screens.

A flexible corrugated drainage tube has been patented that consists of alternating annular peaks and annular valleys with walls connecting the peaks and valleys. Openings in selected valleys of the tube are arranged transversely to the longitudinal axis of the tube so that liquid water can drain into the tube through the openings. A water permeable restraining screen surrounds the tube and en-

gages the peaks. The screen prevents waterborne particles above a certain size from entering the tube when water drains into the tube. The water permeable screen allows waterborne silt and clay to pass through, which keeps the screen from becoming clogged. (Orr-FIRL)
W75-03210

METHOD AND DEVICE FOR WASHING A CONTINUOUS FILTER WITH A HORIZONTAL FILTRATION SURFACE AND CELLS,
Societe de Prayon S.A., Trooz (Belgium). (assignee)
A. Davister.
United States Patent 3,830,658. Issued August 20, 1974. Official Gazette of the United States Patent Office, Vol 925, No 3, p 942, August 1974. 1 fig.

Descriptors: *Patents, *Filters, Filtration, Water treatment, Waste water treatment, Equipment, Sediments.

A method has been patented for washing a continuous filter with a horizontal filtration surface and cells. Washing is done after the discharge of the filtration cake. Water jets of high kinetic energy and/or heavily turbulent water flows are used to cause a mechanical scouring of possible sediments and scales formed on the walls and cloths of the filters during filtration. The wash water is supplied inside the cells. (Orr-FIRL)
W75-03212

CENTRIFUGAL LYOPHOBIC SEPARATOR,
F. W. Booth, and R. A. Bruce.
United States Patent 3,828,524. Issued August 13, 1974. Official Gazette of the United States Patent Office, Vol 925, No 3, p 390, August 1974.

Descriptors: *Patents, *Filters, *Separation techniques, *Centrifugation, Equipment, *Waste water treatment, Filtration.

A centrifugal separator using a lyophobic filter has been patented. It is designed for removing liquid particles from a mixed stream of gas and liquid under conditions of negative or positive external acceleration or weightlessness. Rotating the filter and inclining it to the entering flow improves the lyophobic properties of the filter. This position allows gross separation of larger liquid particles and prevents prolonged contact of liquid droplets with the spinning filter. If prolonged contact of droplets with the filter was allowed to occur, the filter properties might be changed or the filter could become blocked. (Orr-FIRL)
W75-03213

APPARATUS FOR REMOVING SLUDGE FROM A RECTANGULAR FLOTATION TANK,
Degremont Societe Generale d'Epuration at d'Assainissement, Rueil-Malmaison (France). (assignee)
J. Lefur, R. Lauboutin, and V. Savall.
United States Patent 3,831,767. Issued August 27, 1974. Official Gazette of the United States Patent Office, Vol 925, No 4, p 1243, August 1974. 1 fig.

Descriptors: *Patents, *Sewage treatment, *Sludge, Equiment, Sludge disposal, *Waste water treatment, Flotation.

An apparatus is described that removes sludge from a rectangular sewage flotation tank. It is a bridge structure with a horizontal drum provided with vanes mounted on a bridge structure. The direction of the rotation of the drum and vane assembly is opposed to the direction of travel of the bridge structure when the surface is being scraped. A scraper blade pushes the sludge toward the front of the moveable vanes of the drum. The removed sludge is fed to a discharge device mounted inside the tubular shaft of the drum. The sludge is collected in a container fastened to the bridge. (Orr-FIRL)
W75-03214

NEW APPROACH TO PREVENTING BULKING SLUDGE,
Agricultural Univ., Wageningen (Netherlands). Dept. of Water Purification.
J. H. Rensink.
Journal Water Pollution Control Federation, Vol 76, No 8, p 1888-1894, August, 1974. 4 fig, 2 tab, 26 ref.

Descriptors: *Activated sludge, *Bulk density, Microorganisms, Organic loading, Biochemical oxygen demand, *Waste water treatment, Biological treatment.
Identifiers: *Sludge volume index, *Bulking.

One of the problems associated with the activated sludge treatment of waste water is bulking sludge which settles and compacts poorly. Bulking sludge causes the loss of activated sludge and a breakdown in the process. The occurrence of bulking sludge in batch, completely mixed, and plug-flow systems was studied. It was found the sludge volume index (SVI) of the batch system was constant at a loading of 300 g BOD5/day/kg MLSS and had a value below 100 (normal). The SVI of the completely mixed system rose as the loading increased. If the loading was above 300 g BOD5/day/kg MLSS, the sludge of the batch system bulked after many days of operation but the completely mixed system bulked immediately after one or two days. The SVI at a loading of 100 and 300 g BOD5/day/kg MLSS in the plug-flow system was low, stable, and similar to the SVI of the batch system. The filamentous microorganisms that caused bulking were Sphaerotilus natans, Flavobacter, Flexibacter, or Haliscomenobacter. One of the microorganisms usually predominated depending on the initial sludge and organic loading. The batch system had more sludge growth than the completely mixed system. (Orr-FIRL)
W75-03215

RECOVERY OF ESCHERICHIA COLI FROM CHLORINATED SECONDARY SEWAGE,
Florida Univ., Gainesville. Dept. of Environmental Engineering Sciences.
J. R. Braswell, and A. W. Hoadley.
Applied Microbiology, Vol 28, No 2, p 328-329, August 1974. 1 fig, 1 tab, 5 ref.

Descriptors: *Bioassays, *Bioindicators, *Coliforms, Chlorination, Sewage treatment, Disinfection, Chlorine, Bacteria, Analytical techniques, *E. coli, *Waste water treatment, Water quality standards.
Identifiers: Standard methods.

If bacterial assays are to be used to test the efficacy of chlorination of secondary sewage effluents and if effluent standards are to place limitations upon discharges of indicator bacteria, then dependable standardized methods must be employed for their enumeration. This study examined injury to E. coli that occurred during chlorination and evaluated the current methods for counting the fecal coliforms in chlorinated effluents. Methods studied included most probable number (MPN) determined on 5-tube serial dilutions in lactose broth and in EC broth incubated at 44.5 degrees C and membrane filters incubated on m-FC medium and spread plates on Trypticase soy agar. Decreases in viable counts obtained by all methods tested occurred exponentially. The decrease in viable count determined by the membrane filter technique had a higher and more variable rate than the other techniques. Recovery of unstressed cells occurred equally well by all the methods. The results of the study demonstrated that counts of fecal coliforms in chlorinated secondary effluents must be considered low when measured by currently used techniques. The difference between counts made with present methods and the true viable counts increased with the length of exposure to chlorine. (Orr-FIRL)
W75-03216

OYSTERS, ALGAE AND SEWAGE,
J. H. Douglas.
Science News, Vol 106, No 11, p 170-171, September 14, 1974. 3 fig.

Descriptors: *Tertiary treatment, *Nutrient removal, *Oysters, Agriculture, Economic feasibility, *Phosphorus, *Nitrogen, Biological treatment, Sewage treatment, Heavy metals, Viruses, *Waste water treatment, Pilot plants.
Identifiers: Seaweed.

Scientists at the Woods Hole Oceanographic Institution have in the pilot plant stage a method of removing the inorganic compounds of nitrogen and phosphorous by using them to grow algae to feed oysters. The laboratory expects facilities like their pilot plant to produce about 6,000 bushels of oysters per acre of tank per year. The seaweed that is being grown, Irish moss, is also economically attractive because it contains carrageenan, a binder used in ice cream and cosmetic manufacture which has no synthetic substitute. A crop of 25 to 50 tons of seaweed per acre per year is expected. It is estimated that a facility large enough to provide tertiary sewage treatment for a coastal town of 50,000 might have an annual income of $4 or $5 million from the sale of oysters and seaweed. Problems with the system that have not been solved include the presence of viruses which might become concentrated in the oysters and the removal of heavy metals which will become concentrated in the oysters. (Orr-FIRL)
W75-03217

ACHIEVEMENTS IN WASTE WATER PURIFICATION AND MECHANICAL SLUDGE DRYING BY MEANS OF SYNTHETIC ORGANIC POLYMERS (PROGRES REALISES DANS LA CLARIFICATION DES EAUX RESIDUARIES ET LE SEGHAGE MECANIQUE SES BOUES PAR L'EMPLOI DE POLYMERS ORGANIQUES DE SYNTHESE),
Institut de Recherches Hydrologiques, Nancy (France).
J. C. Boeglin.
Pure and Applied Chemistry, Vol 37, No 3, p 343-374, 1974. 13 fig, 4 tab, 19 ref.

Descriptors: *Separation techniques, *Waste water treatment, *Flocculation, *Water purification, Incineration, Slurries, Sludge, *Polymers, Suspended solids, Dehydration.

Solid-liquid separation is found in all waste water treatment processes. Solid-liquid separation eliminates suspended matter from the waste water, purifying the water before disposal or for reuse in the plant by recycling. It also allows the maximum concentration of the solids in the form of slurries or sludges. The sludges and slurries can undergo a mechanical dehydration treatment to produce a solid sediment that can be incinerated or removed with almost no cost and handling problems. The synthetic flocculants now on the market greatly improve purification and treatment methods that include solid-liquid separation. In order to use these polymers in an exact manner, the mechanism of their action must be known. Examples are given illustrating the actions of flocculants in the different phases of purifying and treatment processes for waste water and sludges. (Orr-FIRL)
W75-03219

COLUMNS REPRESENTING MOUND-TYPE DISPOSAL SYSTEMS FOR SEPTIC TANK EFFLUENT: 1. SOIL-WATER AND GAS RELATIONS,
F. R. Magdoff, J. Bouma, and D. R. Keeney.
Journal of Environmental Quality, Vol 3, No 3, July-September 1974. 8 fig, 4 tab, 15 ref.

Descriptors: *Model studies, *Sewage disposal, *Aerobic conditions, *Anaerobic conditions, Landfills, Puddling, Methane, *Water reuse,

Waste water treatment, Soils, *Septic tanks, Waste water disposal.
Identifiers: *Mound-type disposal system.

Columns were designed to model a mound-type disposal system for receiving septic tank effluent on problem soils. The columns were filled with gravel to represent creviced bedrock, silt loam to represent the original topsoil, a sand or sandy loam fill representing fill material, gravel to represent the seepage bed, and another layer of silt loam to represent the mound cover. Septic tank effluent was applied to the columns at a rate of 2 cm every 6 hours. Until permanent ponding at the fill-gravel interface caused by crusting occurred, the fill was aerobic and the silt loam representing the original topsoil was anaerobic. Higher redox potentials were present in the fill than in the silt loam. After the continuous ponding, moisture tension fluctuations almost stopped., the subcrustal soil became anaerobic, and the redox potentials greatly decreased and became negative. When field conditions were simulated by perforating the column walls, aerobic conditions were maintained in the subcrustal fill. (Orr-FIRL)
W75-03220

TERTIARY PLANT HAS SUPPLIER-INSTALLED AUTOMATIC CONTROL SYSTEM.
Instrumentation, Vol 27, No 2, p 9-11, 1974.

Descriptors: *Waste water treatment, *Municipal wastes, *Automatic control, Facilities, Operation and maintenance, Filters, Pumps, Chemicals, Sludge, Equipment, *California, *Treatment facilities, Tertiary treatment.
Identifiers: Honeywell control system.

A Honeywell control system has been installed at the new Chino Basin Municipal Water District's advanced waste water treatment facility near Ontario, California. The control system incorporates automatic process. The filter beds are backwashed automatically, activated either by a loss-of-head or a timer if the head-loss point is not reached. All critical variables are indicated and recorded at the central control panel. Pump control switching is also done at the central control panel. Flow control is designed to assure a constant throughput. Chemical additions include chlorine, alum, and polyelectrolyte. The addition of the polymer has cut alum requirements and reduced and chloride and sulfate content in the final effluent. Sludge is on a pre-programmed schedule. The control systems were designed for efficient and safe operation, easy operator training, and minimum maintenance. (Orr-FIRL)
W75-03223

THE ROLE OF MODELING IN ENGINEERING DESIGN,
Gilbert Associates, Inc., Reading, Pa.
C. W. Schaeffer.
Public Works, Vol 105, No 9, p 78-80, September 1974. 4 fig.

Descriptors: *Construction, *Design, *Model studies, Facilities, Engineering, Domestic wastes, Waste water treatment, Environmental engineering, Project planning, *Treatment facilities, Water supply.
Identifiers: *Engineering models.

Although engineering models have been well accepted as design and communication aids by the industrial community, the municipal services industry has only slowly begun to use models. The new waste water treatment plants involve design and construction procedures about as complex as those for a chemical plant. Major problems of integrating new plant components arise when older plants are upgraded to meet new treatment standards and increased influent volumes. Detailed reviews of plant design and operation is now required by a larger number of public organizations and regulatory agencies. Models can be utilized in all these situations. A rough-out or preliminary model, usually of wood, polyurethane, or polystyrene, is utilized in the earliest stages of design. When design is in advanced stages, detailed engineering models are used to help coordinate all engineering and design efforts. Models of modular construction allow access to individual units for revision and inspection. Access roads, pipeline and utility routes, erosion controls, landscape, architectural and esthetic factors can be analyzed before construction begins by using land site models. Models can be used by the municipal services industry in all stages of planning and construction of waste treatment plants or water supply facilities. (Orr-FIRL)
W75-03224

STATUS OF CONSTRUCTION FOR ENVIRONMENTAL PROTECTION,
Bureau of Domestic Commerce, Washington, D.C. Construction, Water Resources and Engineering Services Div.
K. L. Kollar.
Public Works, Vol 105, No 9, p 85-86, 128, September 1974. 5 tab.

Descriptors: *Construction, *Costs, Facilities, Water supply, Sewers, *Waste water treatment, Water policy, *Treatment facilities.

About $2.1 billion or one-third of the total amount spent on construction in 1972 was involved in construction of water distribution and waste water collection systems. The total construction for public and private water and waste water systems including treatment plants was about $3.2 billion. The total spent on water and sewer utilities increased in 1973 to $3.2 billion. The most significant growth of waste water disposal is a result of the 1972 amendments to the Water Pollution Control Act. There is a steadily increasing market in the waste water field for construction contractors. However, no radical or rapid growth is expected for the next few years. Projections that have been made on future construction in the waste water field, based on subjective evaluations of backlog requirements, obsolescence and depreciation of already existing facilities, the rate of population growth and the optimum population density that can be served, are subject to future fundings. The backlog for water supply systems can be considered to be only five percent of the population. Patterns of housing construction will probably have the greatest effect on the static water supply construction market. The certification procedures for waste water construction have been made more flexible and the local agencies have been given more responsibility by the EPA. The construction industry will be faced with the problems present in our economy, those of shortages and higher costs. (Orr-FIRL)
W75-03226

GROWTH OF SPIRULINA MAXIMA ALGAE IN EFFLUENTS FROM SECONDARY WASTEWATER TREATMENT PLANTS,
University of Western Ontario, London. Dept. of Chemical and Biochemical Engineering.
N. Kosaric, H. T. Nguyen, and M. A. Bergougnou.
Biotechnology and Bioengineering, Vol 16, No 7, p 881-896, July 1974. 10 fig, 2 tab, 12 ref.

Descriptors: *Algae, *Waste water treatment, *Tertiary treatment, *Nutrient removal, Phosphorus, Nitrogen, Domestic wastes, Municipal wastes, Foreign research, *Canada, Water pollution effects.
Identifiers: *Spirulina maxima.

The algae Spirulina maxima were grown in effluents from the secondary municipal waste water treatment plant in London, Ontario, to investigate the factors influencing the growth of the algae and the value of this treatment with regard to nutrition (production of a biomass suitable for animal or human consumption) and tertiary waste water treatment (nitrogen and phosphorus removal). There was a high yield of algae when the pH was adjusted to be between 9 and 10; growth was drastically reduced at pH 11 and inhibited below pH 8. Higher light intensity improved growth and constant light also improved growth. The optimum temperature for growth was between 25 and 40 C but the algae began dying at these extremes. The nutritional quality of the algae was acceptable. The removal of nitrogen was found to be much faster than the removal of phosphorus. Nitrogen tends to be the limiting factor in Spirulina culture. The removal of nitrients from waste water appears to depend on the amount of algae in the culture, the initial concentration of nutrients and the culture conditions. The preliminary design of an algae plant for treating sewage is presented. (Orr-FIRL)
W75-03229

IRRIGATION OF CITRUS WITH CITRUS PROCESSING WASTE WATER,
Agricultural Research and Education Center, Lake Alfred, Fla.
R. C. J. Koo.
Proceedings of the Florida State Horticultural Society, November 1973. Vol 86, p 233-237, 3 tab, 8 ref. OWRT A-016-FLA(2), 14-31-0001-3809.

Descriptors: *Citrus, *Irrigation, Nutrients, Water pollution, Waste water disposal, *Florida, *Water reuse, Fruit, Industrial wastes.

Several citrus scion-rootstock combinations were grown in the greenhouse for 3 years with treated waste water from 2 citrus processing plants in central Florida. No harmful effects were observed from the use of treated citrus waste water. Supplemental fertilization was necessary to sustain the trees because treated citrus waste water was low in nutrients. Observations of young and mature citrus trees irrigated with untreated waste water under field conditions indicated quantity was more critical than quality of the waste water applied. Cultural practices in the grove should be modified to compensate for the changed environment. Soil in the citrus grove serves as a filtering system to the waste water. A marked reduction in the BOD, COD, and N contents were observed as the waste water percolates through the soil profile. The results were similar to that obtained by biological aeration treatment of citrus waste water. (Morgan-Florida)
W75-03274

5E. Ultimate Disposal Of Wastes

LOWER COST METHODS OF WATER AND WASTE TREATMENT IN LESS DEVELOPED COUNTRIES,
Oklahoma Univ., Norman.
For primary bibliographic entry see Field 5D.
W75-02786

TOXIC WASTE HANDLING BECOMES CHEAPER.
For primary bibliographic entry see Field 5D.
W75-02865

SPRINKLER APPLICATION OF LIQUID WASTES FROM HOLDING PONDS,
For primary bibliographic entry see Field 5D.
W75-03014

DAIRY AND SWINE WASTE SYSTEMS,
For primary bibliographic entry see Field 5D.
W75-03016

LIVESTOCK WASTE MANAGEMENT SYSTEMS - MANAGEMENT AND MAINTENANCE DESIGN CONSIDERATIONS,
Agricultural Research Service, Lincoln, Nebr.
For primary bibliographic entry see Field 5D.

W75-03017

TYPICAL AND UNIQUE DISPOSAL SYSTEMS SURFACE DRAINAGE FOR A LEVEL FEEDLOT,
Agricultural Research Service, Lincoln, Nebr.
For primary bibliographic entry see Field 5D.
W75-03018

SUBMERGED COMBUSTION EVAPORATOR FOR CONCENTRATION OF BREWERY SPENT GRAIN LIQUOR,
Anheuser-Busch, Inc., St. Louis, Mo. Engineering Dept.
For primary bibliographic entry see Field 5D.
W75-03050

CUTTING WIRE-MILL POLLUTION,
For primary bibliographic entry see Field 5D.
W75-03073

EVALUATION OF LIME/LIMESTONE SLUDGE DISPOSAL OPTIONS.
Radian Corp., Austin, Tex.
For primary bibliographic entry see Field 5D.
W75-03118

COSTS OF HAULING AND LAND SPREADING BY DOMESTIC SEWAGE TREATMENT AND PLANT SLUDGE,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5D.
W75-03129

DISPOSAL OF COMMUNITY WASTEWATER.
World Health Organization, Geneva (Switzerland).
For primary bibliographic entry see Field 5D.
W75-03199

COLUMNS REPRESENTING MOUND-TYPE DISPOSAL SYSTEMS FOR SEPTIC TANK EFFLUENT: 1. SOIL-WATER AND GAS RELATIONS,
For primary bibliographic entry see Field 5D.
W75-03220

IRRIGATION OF CITRUS WITH CITRUS PROCESSING WASTE WATER,
Agricultural Research and Education Center, Lake Alfred, Fla.
For primary bibliographic entry see Field 5D.
W75-03274

5F. Water Treatment and Quality Alteration

EVALUATION OF THE BENEFITS OF RURAL WATER SUPPLY PROJECTS IN TANZANIAN VILLAGES,
Duke Univ., Durham, N. C. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6B.
W75-02769

THE DESIGN AND APPLICATION OF A MANAGEMENT INFORMATION SYSTEM FOR DRINKING WATER QUALITY DATA,
Philadelphia Water Dept., Pa.
For primary bibliographic entry see Field 5A.
W75-02776

WATER SUPPLY AND SEWER SYSTEM FOR THE CITY OF CHICAGO,
Chicago Dept. of Water and Sewers, Ill.
R. A. Pavia.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings, of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 360-367.

Descriptors: *Water supply, *Sewers, *Public health, *Pollution abatement, *Water treatment, *History, Planning, *Illinois, Water quality, Storm drains, Lake Michigan, Urban drainage, Utilities, Waste dilution, Community development, Waste water treatment.
Identifiers: *Chicago(Ill).

In 1852, the City purchased the 10 year old Chicago City Hydraulic Company and began constructing a new water system which supplied a population of 65,000 when completed in 1854. By 1861 the system included a lake inlet, pumping station, 3 elevated reservoirs, and 95 miles of cast iron pipe. It supplied 120,000 Chicagoans with an average daily pumpage of 4,842,000 gallons. Today the system supplies an average of more than one billion gallons per day to 4.5 million residents in its service area. The system now includes the world's two largest water filtration plants, four lake inlet cribs, 72 miles of water tunnels, 11 pumping stations, and over 4000 miles of water mains. The Chicago Sewer system was also traced from its beginning in 1834. Typhoid epidemics in the 1880's provided the incentive to build the drainage canal and divert all of Chicago's sewage from Lake Michigan to the Mississippi River basin. Since that time large waste water treatment plants have been built and the sewage system has expanded to a length of more than 4100 miles. Current efforts to improve both the drinking water system and the sewage system were described. (See also W75-02751) (Adams-ISWS)
W75-02783

WATER FOR INDUSTRIAL DEVELOPMENT IN BENTON, LAFAYETTE, MARSHALL, PONTOTOC, TIPPAH, AND UNION COUNTIES, MISSISSIPPI,
Geological Survey, Jackson, Miss.
For primary bibliographic entry see Field 2E.
W75-02814

MID CALDER WATER BOARD OPENS TWO NEW TREATMENT WORKS.
Water Services, Vol 78, No 935, p 22-24, January, 1974.

Descriptors: *Water treatment, *Treatment facilities, *Coagulation, *Filtration, Chemicals, *Waste water treatment.
Identifiers: England.

Two new water treatment plants with a total capacity of 9 mgd have been opened by the Mid Calder Water Board, England. The plants employ sodium hydroxide, ferrous sulfate, and chlorine for conditioning of raw water, followed by clarification using sludge blanket tanks, and final processing by rapid gravity filtration. Dirty water after backwashing is delivered to the waste water recovery plant. (Sandoski-FIRL)
W75-02877

DRINKING WATER ADDITIVES: PHYSICAL GROWTH AND BEHAVIORAL DEVELOPMENT OF MICE RECEIVING CHLORINE AND FLUORINE,
Connecticut Univ., Storrs. Inst. of Water Resources.
For primary bibliographic entry see Field 5C.
W75-02882

FLOATING CHEMICAL FEEDING AND CHEMICAL PROCESS PLANT FOR WATER PURIFICATION,
For primary bibliographic entry see Field 5D.
W75-02933

WATER QUALITY FOR POTABLE REUSE OF WASTEWATER,
Dallas Water Reclamation Research Center, Tex.
For primary bibliographic entry see Field 5D.
W75-03008

DEVELOPMENT OF A MONTHLY MUNICIPAL TECHNOLOGY BULLETIN,
Franklin Inst. Research Labs., Philadelphia, Pa.
For primary bibliographic entry see Field 5D.
W75-03051

HEART DEATHS AND FLUORIDATION,
For primary bibliographic entry see Field 5C.
W75-03172

THE WATER SUPPLY INDUSTRY.
Proceedings of the Society for Analytical Chemistry: Analytical Division, Chemical Society, Vol 11, No 4, p 41-42, March 1974. 1 tab, 10 ref.

Descriptors: Water supply, *Water supply development, *Water management(Applied), Water pollution effects, Water pollution sources, *Water reuse, Sewage, Water resources, Water conservation, Rivers, Organizations, Technical societies, Analytical techniques, *Water treatment.
Identifiers: *United Kingdom(Great Britain).

The water supply industry in Great Britain is discussed. Under present circumstances, water management in Great Britain is fragmented and lacks uniformity. With the existing arrangements the water services are divided into three parts: water supply, sewerage and sewage, and river and water resources management. As the comsumption of water for domestic and industrial purposes continues to increase, more consideration is being given to augmenting existing supplies by the use of underground sources, river water, treated effluent, and by opening up new catchment areas. The recycling and reuse of water will also become commonplace and cheaper alternative supplies of less pure water will be offered increasingly to industrial users. It is expected that there will be close liaison between industry and the new Regional Water Authorities. Rivers are also the recipients of surface water, sewage, and industrial wastes, which, coupled with the growing use of a diversity of new materials and active ingredients, increases the risk of water supplies becoming polluted between the source and the consumer. The need for stricter analytical surveillance is urgent. (Merritt-FIRL)
W75-03189

ASBESTOS IN DRINKING WATER,
Vermont State Dept. of Health, Burlington. Div. of Environmental Health.
For primary bibliographic entry see Field 5A.
W75-03190

HINDERED SETTLING AND SLUDGE BLANKET CLARIFIERS,
New South Wales Univ., Kensington (Australia). Dept. of Public Health Engineering.
For primary bibliographic entry see Field 5D.
W75-03196

SUTTON TO SOFTEN WATER BY ION EXCHANGE.
Water and Waste Treatment, Vol 17, No 8, p 44, 46, August 1974. 1 fig.

Descriptors: *Ion exchange, *Water softening, *Hardness(Water), *Scaling, Water purification, Water quality, Equipment, Costs, Potable water, Foreign research, *Water treatment, Water supply.
Identifiers: Dealkalisation, United Kingdom(Surrey-G.B.).

A 470,000 pound contract for equipment to soften drinking water supplies was awarded to PD Process Engineering by Sutton District Water Company, Surrey, Great Britain. The softening is accomplished by dealkalization which reduces the total hardness and reduces the dissolved solids. The water produced reduces scale and is more acceptable to industry. The water to be treated enters a ion exchange resin where the calcium and magnesium hardness salts are exchanged for hydrogen ions. Bicarbonates in the water combine with the hydrogen ions and carbon dioxide is released when the water passes through a degasser. Seventy percent of the total flow is treated; the total hardness is reduced from 290 ppm to 125 ppm. The treated water is blended with the remainder. The ion exchange resins are automatically regenerated after a set limit of imparied ability is reached. The final system will consist of two streams each having three ion exchange resins operating while one is being regenerated. The plant is designed to fail safe in the case of a failure. (Orr-FIRL)
W75-03218

SORTING OUT IRON IN WATER SUPPLIES,
Ontario Ministry of the Environment, Toronto (Ontario). Pollution Control Branch.
F. J. Dart.
Water and Pollution Control, Vol 112, No 8, p 26, 28, August 1974.

Descriptors: *Water quality control, *Water supply, *Water conveyance, *Iron, Aquifers, Pipelines, Metal pipes, Corrosion, *Corrosion control, Hydrogen ion concentration.

Iron problems in water supplies must be thoroughly diagnosed to determine the basic causes, or else remedial measures become expensive hit or miss propositions. To find the problems of iron in the distribution system a series of steps is given. Electrolyte corrosion possibilities should be evaluated, chemical corrosivity should be evaluated, and then the corrosivity potential of the water through encouragement of bacterial activity should be determined. It seems that well chlorinated waters with less than 0.15 mg/liter organic nitrogen, less than 4-5 mg/liter total organic carbon, and less than 50-70 cu ft of asporator-extractable methane per 100,000 gallons do not develop nuisance organism problems. Electrolyte corrosion can usually be corrected by standard techniques to remove the cause. Chemical corrosiveness can sometimes be corrected by increasing the water pH by adding soda ash or lime; or the addition of lime or limestone contact retention might be an alternative if the water hardness is low. After measures to prevent iron problems have been taken, the mains can be swabbed with compressible foam sponges to give the mains renewed lease for distributing clean water. (Orr-FIRL)
W75-03230

5G. Water Quality Control

WATER FOR THE HUMAN ENVIRONMENT, VOLUME III, TECHNICAL SESSIONS.
For primary bibliographic entry see Field 2A.
W75-02751

WATER QUALITY PROBLEMS IN BANGLADESH,
Bangladesh Directorate of Public Health Engineering, Dacca.
M. A. Hussain, and J. Arbuthnot.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 87-103. 7 fig, 4 tab.

Descriptors: Water resources, *Water quality, *Potable water, *Irrigation water, *Domestic water, *Water use, Irrigation, Water analysis, Water chemistry, Surface waters, Chemical analysis, Chemistry, Salinity, Water utilization, Water wells, Groundwater, Quality control, Monsoons, Bacteria, Industrial wastes, Hardness(Water), Iron, Cloride, Alluvium.
Identifiers: *Bangladesh, Tube wells.

Most of the land area of Bangladesh is made up of alluvial deposits from three principal rivers, two rising in India and one largely in Bangladesh itself. Although the country is heavily populated, water resources are sufficient to meet present demands. However, expected river diversions both upstream of and within Bangladesh, for rising industrial growth and increased use of water for irrigation, will soon make the supply inadequate. Water quality is also a problem. The possibility of higher bacterial counts and increased alkalinity intrusion in the lower delta, as well as increasing use of pesticides and fertilizers, contribute to the growing seriousness of the present situation. Chemical analyses made on samples of both the groundwaters and surface water were discussed. (See also W75-02751) (Henley-ISWS)
W75-02758

ENVIRONMENTAL ASSESSMENT: AN AID IN WATER RESOURCE MANAGEMENT,
Battelle Memorial Inst., Columbus, Ohio.
For primary bibliographic entry see Field 6G.
W75-02761

SOME NECESSARY CONDITIONS FOR EQUILIBRIUM AMONG MANKIND, ENVIRONMENT, AND ECONOMY,
Illinois State Environmental Protection Agency, Springfield. Div. of Water Pollution Control.
For primary bibliographic entry see Field 6B.
W75-02762

WATER SUPPLY/SEWERAGE--A REQUIRED SOCIAL OVERHEAD FACILITY IN DEVELOPING COUNTRIES,
Camp, Dresser and McKee International, Inc., Boston, Mass.
For primary bibliographic entry see Field 6B.
W75-02768

THE POTENTIAL POLLUTION INDEX AS A TOOL FOR RIVER WATER QUALITY MANAGEMENT,
International Reference Centre for Community Water Supply, The Hague (Netherlands).
For primary bibliographic entry see Field 5A.
W75-02781

WATER CONSERVATION AND POLLUTION CONTROL IN INDIA--AN ENVIRONMENTAL APPROACH,
For primary bibliographic entry see Field 4A.
W75-02789

CHEMICAL ADDITIVES TO CONTROL OIL SPILLS--A STATE OF THE ART SUMMARY,
Rensselaer Polytechnic Inst., Troy, N.Y.
For primary bibliographic entry see Field 5B.
W75-02808

FLOATING ANTI-POLLUTION APPARATUS,
Firestone Tire and Rubber Co., Akron, Ohio. (assignee)
J. R. Laman.
U. S. Patent No 3,834,538, 3 p, 5 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 926, No 2, p 484, September 10, 1974.

Descriptors: *Patents, *Pollution abatement, *Skimming, *Flotsam, Water pollution control, Water quality control, Floats, Equipment, Rivers, *Separation techniques.
Identifiers: Stream pollution.

A floating anti-pollution apparatus for anchoring across a stream to skim the water and collect the debris comprises a buoyant boom with ends for fitting into shore abutments and an upstream side presenting a baffle surface. Associated with the boom is a series of longitudinally moving paddles adjacent the baffle surface and a ramp. Coaction of the paddle and the ramp moves skimmed liquids and collected debris to a collection sump while permitting drainage of water back to the stream. The boom may consist of a plurality of floating wood parts separated by spacers and having a predetermined length sufficient to span a stream at an oblique or acute angle and for insertion within shore abutments. The anchors at the ends of the boom may include a vertically oriented guide permitting rise or fall of the boom during changes of water level. The paddles may be relatively rigid rubber wiper blades secured at right angles to a closed-loop. The ramp may be a box-like structure inclined upward and extending from a point below the water surface to a point above the sump. The bottom and side walls of the ramp are dimensioned so that the wiper blades will be frictionally engaged during movement. (Sinha-OEIS)
W75-02835

OIL SPILL CONTROL,
Cities Service Oil Company, Tulsa, Okla. (assignee)
J. A. King.
U. S. Patent No 3,835,049, 3 p, 7 ref; Official Gazette of the United States Patent Office, Vol 926, No 2, p 609, September 10, 1974.

Descriptors: *Patents, *Coagulation, *Oil pollution, *Oil spills, *Pollution abatement, Equipment, Separation techniques, Water pollution control.
Identifiers: Drying oils, Hydrocarbon oils.

Hydrocarbon oil floating on the surface of water can be readily recovered by admixing with the hydrocarbon oil in the presence of oxygen one to fifty parts by weight of a drying oil per one hundred parts by weight of the hydrocarbon oil, and then removing the admixture from the surface of the water with any conventional means for removing floating oil from the surface of water. The coagulated hydrocarbon oil is much more readily collected and removed from the surface of the water than uncoagulated hydrocarbon oil. Such drying oils are in general tricarboxylates of glycerin and unsaturated carboxylic acids. Such tricarboxylates are usually derived from natural sources and examples of such drying oils are tung oil and linseed oil. (Sinha-OEIS)
W75-02842

OIL ABSORBENT FOAMED SILICATE FOR OIL POLLUTION CONTROL,
GAF Corp., New York. (assignee)
J. M. C. Whittington, J. E. Meyer, and G. D. Tingle.
U. S. Patent No 3,843,306, 6 p, 2 ref; Official Gazette of the United States Patent Office, Vol 927, No 4, p 1583, October 22, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, Water quality control, *Water pollution control, *Pollution abatement, Foam separation, Solvents, *Silicates.
Identifiers: Alkali metal silicates, Silicate foam, Oleophilic-hydrophobic agent.

A porous alkali metal silicate foam having oleophilic-hydrophobic properties is provided for use in oil spill control and removal. The silicate foam is formed from a blend comprising solid and liquid alkali metal silicates and an oil absorption-water repellent agent. The blend is pelletized, heated in an oven to expand the material into foam particles, and then shredded, graded and re-treated with an oleophilic-hydrophobic agent to coat the internal and external surfaces and thereby further enhance the oil-absorption characteristics. The foam particles float on water and can absorb about 3 times

their own weight in oil without being wetted by the water. When spread over approximately 75% of an oil slick area, the oil is immediately wicked into the foam and can be ignited. Burning continues until the oil is completely consumed. The silicate foam is incombustible and can be reused. The foam also permits recovery of the oil, rather than burning. The oil soaked particles can be skimmed from the surface and the oil extracted by the use of solvents. (Sinha-OEIS)
W75-02843

ACHIEVING WATER POLLUTION ABATEMENT UNDER THE 1972 WATER POLLUTION CONTROL ACT AMENDMENTS,
Office of Business Research and Analysis, Washington, D.C. Water Resources and Engineering Program.
K. L. Kollar, and R. Brewer.
Industrial Wastes, Vol 19, No 6, p IW/10, IW/12-IW/13, IW/27, November/December, 1973. 1 fig, 5 tab.

Descriptors: *Water pollution control, *Water Pollution Control Act, *Industrial wastes, Water pollution sources, Costs, Municipal wastes, Professional personnel, Capital costs, Water utilization, *Pollution abatement, *Treatment facilities.

The achievement of water pollution abatement under the 1972 Water Pollution Control Act Amendments is discussed. One of the most controversial issues is the implementation of best practicable technology by July 1977, best available technology economically achievable by July 1, 1983, and the goal of eliminating discharge of pollutants by 1985. The development of area wide waste treatment management plants by March, 1974 is also a provision. There is a lack of qualified personnel of the various professional disciplines required to adequately implement all the technical requirements established by law at the federal, state, and local levels. While most industrial plants will be tying into municipal systems, more than 10,000 plants may be required in the future to make large capital investments specifically for treatment facilities, in connection with their own sizeable industrial water use. There is a strong possibility that many plants may attempt to avoid some of the capital costs they face by tying into municipal treatment facilities. (Merritt-FIRL)
W75-02860

MODELING AND OPTIMIZATION OF TRANSIENT COOLING WATER DISCHARGE FROM POWER GENERATING PLANTS: PHASE II - APPLICATIONS TO REGIONAL SITUATIONS,
Kansas State Univ., Manhattan. Dept. of Industrial Engineering; and Kansas State Univ., Manhattan. Dept. of Chemical Engineering.
C. L. Hwang, and L. T. Fan.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 311, $3.75 in paper copy, $2.25 in microfiche. Kansas Water Resources Research Institute, Manhattan, Contribution No 150, August 1974. 32 p, 8 fig, 1 tab, 7 ref. OWRT B-037-KAN(1). 14-31-0001-4086.

Descriptors: Water quality control, *Optimization, *Model studies, *Regional analysis, *Thermal pollution, *Cooling water, Kansas, Management, Powerplants, Optimum development plans, Design.
Identifiers: *Kansas River(Kan).

The purpose of the research was to establish a general design procedure which can be used for determining a cooling water discharge policy for a power plant so as not to lead to deterioration of environmental quality. The study provides the basis for (1) water quality modeling and its experimental verification for the Kansas River, (2) optimal configuration of the cooling system for power generation, (3) optimal artificial aeration systems for water quality control of streams receiving thermal and organic waste discharges, (4) optimal basin-wide water quality management under minimum treatment level regulations, and (5) regional water quality management through coordination of urban and agricultural pollution control. Presented are the results of systematic investigation on water quality control by artificial aeration and of design studies of an optimal cooling system for power generation. Also presented are procedures for regional water quality management of streams and lakes receiving a host of thermal and organic wastes; the results of a data collection activity that took place during the months of May and June, 1974, on a stretch of the Kansas River between Topeka and Lawrence; and the results of the verification of mathematical models selected to represent the water quality in the river. The verified model was employed to determine the waste assimilative capacity of the river under various load conditions at a number of pollution sources along the river. (See also W74-06832)
W75-02884

AN ECOLOGICAL INVESTIGATION OF THE ACCURACY OF THE FEDERAL STANDARD OF PERMISSIBLE BORON LEVELS TO WATER RESOURCES,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 5C.
W75-02889

OPTIMAL ALLOCATION OF WATER QUALITY CONTROLS IN URBANIZING RIVER BASINS,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
W. R. Walker, G. V. Skogerboe, and T. L. Huntzinger.
Water Resources Bulletin, Vol 10, No 5, p 845-859, October 1974. 10 fig, 16 ref. OWRT B-043-COLO(12).

Descriptors: *River basins, *Utah, *Water quality control, *Simulation analysis, *Alternative planning, Standards, Optimization, Drainage area, Decision making, Regions, Management, Salinity, Municipal water, Irrigation water, Waste water treatment, Urbanization, Constraints, Desalination, Dissolved solids, Mathematical models, Systems analysis, *Utah.
Identifiers: *Cost minimization, Cost-effectiveness.

Serious water quality degradation being encountered by urbanizing basins in the west calls for implementation of water quality controls. Described is the operation and application of a four-level water quality management simulation model. Total dissolved solids (TDS) is the only quality parameter employed in the model as it represents the most pressing basin-wide problem. The model is used to select optimal water quality control measures for achieving a specified standard in the outflows from individual urban and agricultural areas, districts, and finally from the basin itself. The model is applied to the Utah Lake drainage area of Central Utah. This region is subdivided into five major sub-basins containing both municipal and agricultural water demands. A sub-model of each sub-basin is developed which optimizes the water quality control strategies by linking the urban to the agricultural uses and then evaluating the levels of control for each sector. From these results, a cost-effectiveness function for each sub-basin is generated. Jointly, the cost-effectiveness relationship for each sub-basin is considered. Finally, the model optimizes water quality control on a basin-wide scale by coordinating water quality control in the districts with lake diking and regional desalination, thus accomplishing a specified TDS level in the area outflows at minimum cost. The optimization of water quality control policies results in a savings of $10.3 million annually. The results illustrate the influence of regional urbanization and the benefit of using such analysis in making water quality management decisions. (Bell-Cornell)
W75-02908

MOTION DECOUPLED SKIMMER FOR REMOVING OIL FROM THE SURFACE OF CALM OR DISTURBED WATER,
Esso Production Research Co., Houston, Tex. (assignee)
J. L. Glaeser, W. G. Weisert, Jr., and G. R. Cunningham.
US Patent No 3,830,370, 3 p, 8 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 925, No 3, p 866, August 20, 1974.

Descriptors: *Patents, *Pollution abatement, *Oil spills, *Oil pollution, Water quality control, Water pollution control, *Skimming, Equipment, Waves(Water), Flotation, Weirs, *Separation techniques.
Identifiers: Wave motion.

A motion decoupled skimmer for removing oil from the surface of calm or disturbed water includes a floatable pumping assembly which contains a sump, flotation unit, pump and motor surrounded by or positioned within a floatable oil collection assembly. The oil collection assembly contains a weir, flotation unit and a closed flow passageway for conveying oil from the weir to the sump. The weir and its flotation unit are connected together in a fixed relationship (motion coupled). The oil collection assembly is light and responsive to wave motion. (Sinha-OEIS)
W75-02935

LEGAL RESPONSIBILITIES FOR SEWAGE DISPOSAL IN AN URBAN COUNTY,
Ohio Dept. of Health, Columbus. Office of Planning.
S. O. Milliken, M. D. Strauss, and R. Black, Jr.
American Journal of Public Health and the Nation's Health, Vol 58, No 1, p 122-130, January 1968.

Descriptors: *Ohio, *Public health, *Regulation, *Governmental interrelations, Future planning(Projected), Local governments, State governments, Jurisdiction, Planning, Cities, Urbanization, Legal aspects, Comprehensive planning, Administration, Administrative agencies, Management, Non-structural alternatives, Law enforcement, Water policy, Institutional constraints, Political aspects.
Identifiers: *Administrative regulations.

A realistic approach to community health planning requires as an important first step the identification and analysis of legal authority and responsibility. A 1964 case study by the Public Health Federation of the Cincinnati Area conducted in Hamilton County, Ohio, is examined to demonstrate the importance of such analysis. That study investigated the effects of man-made governmental and organizational jurisdictions upon the organization and delivery of health services in the Cincinnati area. State and local statutes and regulations were reviewed to identify the responsibilities of the various health officials and all other public officials whose duties impinge upon the disposal of sewage. The study did not compare the legal authority and responsibility with actual practices and procedures. The study concluded that division of responsibility, legal cloudiness in the definition and imposition of responsibility resulted in local health departments being little more than advisory agencies. Effective community health planning must be area-wide in scope and must bring to bear the powers of government along with the flexibility of voluntary agencies. (Deckert-Florida)
W75-02936

THE FIRST TWO YEARS--A REVIEW OF EPA'S ENFORCEMENT PROGRAM,
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 6E.
W75-02937

CLEAN WATER--$1 BILLION,
Michigan Water Resources Commission, Lansing.
R. W. Purdy, and R. McKee.
Michigan Natural Resources, p 11-13, September/October 1969. 3 illus.

Descriptors: *Government finance, *Interstate waters, *Michigan, *Cost sharing, *Allotments, Federal budget, State governments, Water quality, Waste treatment, Economics, Benefits, Professional societies, Public benefits, Waste water treatment, Legislation, Administration, Administrative decisions, Adoption of practices, Costs, Water law, Water policy, Political aspects.
Identifiers: *Clean Waters Act, *Private interest groups.

The Clean Waters Act of 1965 represents to date more promise than reality. The Act authorizes federal allocation of funds to the states to aid in implementing water quality standards on interstate waters. The federal government may contribute up to 55% of all costs of construction of new water pollution control facilities, but the amount appropriated by Congress has proven far too small to fulfill the goals of the program. For instance, in fiscal year 1970 one billion dollars was authorized, but only $214 million has been appropriated for the states. The Citizens Crusade for Clean Water is a coalition of more than three dozen professional, service, and environmental groups which advocates more thorough funding under the Act. The Crusade anticipates growing support in Congress for the funding and urges citizens to write their representatives to help garner the needed strength to vote full financing of the Act. The appropriation of the whole amount authorized would mean, in Michigan alone, a water control effort of more than $1.3 billion over the next few years. (Salley-Florida)
W75-02940

THE FLORIDA OIL SPILL AND POLLUTION CONTROL ACT, AN INTRUSION INTO THE FEDERAL MARITIME DOMAIN.
Natural Resources Journal, Vol 12, p 615-626, October 1972. 8 ref.

Descriptors: *Federal-state water rights conflict, *Water pollution control, *Constitutional law, *Jurisdiction, *Federal Water Pollution Control Act, Legal aspects, Pollution taxes(Charges), Penalties(Legal), Water law, Governmental interrelations, Judicial decisions, Legislation, Water quality, Governments, Oil spills, Water pollution, Law enforcement, State jurisdiction, Federal jurisdiction, Water policy, Courts.
Identifiers: *Water Quality Improvement Act, *Coastal waters, *Territorial seas(Jurisdiction), *Absolute liability, *Legislation(State).

A recent holding of a three judge federal court in Florida could have considerable impact on state efforts to control water pollution. In American Waterways Operators, Inc. v. Askew, 335 F. Supp. 1241 (M.D. Fla. 1971), prob. juris, noted, 405 U.S. 1063 (1972), the court held the Florida Oil Spill and Pollution Control Act invalid as an attempt to legislate substantive maritime law, an area reserved for federal control under the U.S. Constitution. If affirmed on appeal, this holding will greatly reduce the power of the states to control pollution within their boundaries. The court rejected Florida's arguments of strong local interest and that the legislation filled a void in the federal maritime law. The most effective means of establishing control over polluters, absolute liability and harsh penalties, have been effectively declared off-limits to the states. By forcing the states to rely on federal protection of their waters, this holding directly contradicts the basic policy set forth in the Federal Water Pollution Control Act. The federal government should recognize, preserve, and protect the rights and responsibilities of the states in preventing and controlling water pollution. (Deckert-Florida)
W75-02941

LEGAL ASPECTS OF COASTAL ZONE MANAGEMENT IN THE FLORIDA KEYS,
For primary bibliographic entry see Field 6E.
W75-02942

STREAM POLLUTION--RECOVERY OF DAMAGES.
Iowa Law Review, Vol 50, p 141-157, 1964. 111 ref.

Descriptors: *Water pollution, *Water pollution control, *Riparian rights, *Legal aspects, *Water law, Water rights, Natural use, Natural flow, Prior appropriations, Remedies, Riparian waters, Damages, Common law, Judicial decisions, Prescription, Water quality, Water quality control, Pollution abatement, Municipalities, Legislation, Environmental effects, Adoption of practices, Land management, Water allocation(Policy).

While the primary emphasis in the area of water pollution is presently directed toward developing an efficient national water control program, attention must still be focused on the resultant harm to others who need or use the water. Civil actions where individuals are seeking tort compensation for harm caused by stream pollution is examined. The law of nuisance is the nexus for such actions regardless of whether the conduct complained of arises from negligent, intentional, or abnormally dangerous activities. The dichotomy existing between the doctrines of riparianism and prior appropriation points out the ways in which invasions of the right to use and enjoy land are breached by water pollution. Various aspects of liability, such as joint and several tortfeasors, extent of liability, joinder of parties and the relevant defenses are covered. Additionally, the several concepts of recoverable damages are also noted. While the common law tort actions cannot eliminate the pollution problem on the scale that statutory controls attempt to deal with it, these actions do provide an element of deterence as well as compensation for the individual, injured litigant. (Silber-Florida)
W75-02949

MARINE OIL POLLUTION CONTROL,
Coast Guard, Washington, D.C. Office of Research and Development.
W. E. Lehr.
Technology Review, Vol 75, No 4, p 13-22, February 1973. 8 fig.

Descriptors: *Oil pollution, *Water pollution, *Regulation, *Water quality, *Federal Water Pollution Control Act, Navigable waters, Oil discharges, Oil spills, Water pollution sources, Oil wastes, Water pollution treatment, Oil industry, Oily water, United Nations, Coast Guard regulations, Legal aspects, Shipping, Enforcement, Water law, Water resources development, Water quality control, Pollution abatement, Adoption of practices.
Identifiers: *FWPCA Amendments of 1972.

The huge oil spill which resulted from the wreck of the Torrey Canyon caused widespread contamination of the marine environment. The spill brought worldwide attention to the effects of oil pollution discharges. Since then, a major goal of environmental protection activity has been to enhance water quality by reducing oil discharges. The best solution to the problem of accidental oil spills is to prevent their occurrence. The U.S. Coast Guard has developed regulations to require ships to maintain deck spill containment systems and emergency shut-down valves in oil transfer systems. Improved navigation systems will serve an important role in preventing pollution by reducing shipping accidents. Legislation has been enacted to regulate intentional oil discharges. The Federal Water Pollution Control Act prohibits the discharge of harmful quantities of oil into navigable waters of the U.S. The coast guard is to develop detection systems to facilitate enforcement of the ban on pollutant discharge. The technology currently exists to detect oil discharges, to contain the spill, and to remove the oil. The only limit is the cost. (Proctor-Florida)
W75-02950

WATER POLLUTION AND THE RULE OF LAW,
Environmental Protection Agency, Washington, D.C.
J. R. Quarles, Jr.
Presented at American Bar Association National Institute, New York City, Oct. 26, 1972. 8 p.

Descriptors: *Legislation, *Federal Water Pollution Control Act, *Water pollution, *Pollution abatement, *Water quality, Water quality standards, Effluents, Water pollution sources, Industrial wastes, Permits, Municipal wastes, Water quality control, Water supply, Pollutants, Water law, Legal aspects, Federal government, Waste disposal, Waste water(Pollution), Waste treatment.

The Federal Water Pollution Control Act of 1972 will bring a profound and far-reaching change in the entire system of pollution control. It will change a crude and shaky structure of targets, gaps, and loopholes into a tight regulatory system. First, the law mandates establishment of effluent limitations. These will be specific numerical requirements setting precise upper limits on the waste loads that a plant will be permitted to discharge into waterways. Second, the law establishes higher standards for pollution control. By ending the total reliance on receiving-water conditions, the new standards simplify problems of evidence and establish a uniform national standard applicable to all plants. Third, the new law creates a national permit system. Once issued, these permits will contain within a single document the complete requirements for each individual plant. Fourth, the new law establishes tough penalties to enforce compliance. The new legislation expands the scope of the permit program beyond its coverage under the Refuse Act of 1899, since municipalities and feedlots will be required to obtain permits. (Ritchie-Florida)
W75-02952

POLLUTION ABATEMENT THROUGH SEWER SYSTEM CONTROL,
Dayton Dept. of Water, Ohio.
For primary bibliographic entry see Field 5D.
W75-02955

ENVIRONMENTAL LAW: SUMMARY OF THE FEDERAL WATER POLLUTION CONTROL ACT (AMENDMENTS OF 1972),
Datatronic Systems Corp., Panorama City, Calif.
For primary bibliographic entry see Field 6G.
W75-02956

EPA WATER STRATEGY PAPER,
Pollution Control Guide, Vol 1, paragraph 2412, p 2204-2222, 1973.

Descriptors: *Water management(Applied), *Federal Water Pollution Control Act, *Administrative agencies, *Adoption of practices, *Water pollution control, Water pollution sources, Regulation, Coordination, Decision making, Water quality, Effluents, United States, Technology, Streams, Standards, Water quality control, Legislation, Water quality standards, Federal government, comprehensive planning, Water policy.
Identifiers: *FWPCA Amendments of 1972, *Administrative regulations, *Effluent limitations.

In the development of a management system to administer the Federal Water Pollution Control Act (FWPCA), the Environmental Protection Agency (EPA) compiled this paper which embodies the policy for implementing certain requirements of

the Act. This is a public statement of the EPA's intentions for a decade of water pollution control. The strategy focuses on areas of federal-state program activity. The water strategy paper is designed to play an important part in implementing the 1972 Federal Water Pollution Control Act Amendments. The paper will ensure that regulations issued under the 1972 Amendments are mutually consistent and conform to a single strategy. The control of point source pollution is counted on to achieve national water quality. The principal means of achieving this control is the establishment of a universal base level for effluent limitations derived from currently available pollution control technology. One-third of the stream miles of the United States are in violation of the water quality standards. This index of pollution shows the need for one comprehensive abatement strategy. (Sperling-Florida)
W75-02957

SOURCE-BASED EFFLUENT LIMITATIONS,
Pollution Control Guide, Vol 1, paragraph 901-937, p 901-916, 1973.

Descriptors: *Water pollution control, *Water quality standards, *Regulation, *Federal government, *Federal Water Pollution Control Act, Effluents, Legislation, Navigable waters, Water Quality Act, Water pollution, Water pollution sources, Water quality control, Water quality, Water law, Administration, Water policy, Municipal wastes, Toxins, Industrial wastes, Discharge(Water), Waste water(Pollution), Legal aspects, Administrative agencies, Governmental interrelations.
Identifiers: *Effluent limitations, *Environmental policy, *FWPCA Amendments of 1972, Administrative regulations.

This section pertains to the requirements set forth in the Federal Water Pollution Control Act of 1972 concerning the establishment of source based effluent limitations. Every discharger must comply with at least one or more of the source based effluent limitations that are to be developed by the Environmental Protection Agency (EPA) for classes and categories of sources. The law itself contains no effluent limitations, aside from a complete prohibition against the discharge of any radiological, chemical or biological warfare agent, as high-level radioactive waste into navigable waters. The law merely provides the framework within which the EPA is to develop and apply various kinds of effluent limitations. Generally, EPA must establish four basic kinds of effluent limitations, applicable to municipal dischargers, industrial dischargers, industrial users of publicly owned treatment works, and effluent limitations for toxic substances, applicable to all dischargers. Included are specific provisions dealing with the scope of the limitations, key definitions, toxic substance effluent limitations, and municipal effluent limitations. (Deckert-Florida)
W75-02958

OCEAN DUMPING PERMIT PROGRAM,
Pollution Control Guide, Vol 1, paragraph 1601-1623, p 1601-1613, 1974.

Descriptors: *Permits, *Waste disposal, *Oceans, *Federal government, *Regulation, Disposal, Ultimate disposal, Legal aspects, Water law, Dredging, Administrative agencies, Administration, Regulation, Control, Water pollution, Water pollution control, Waste storage, Water pollution sources, Federal Water Pollution Control Act, Water Quality Act, Interagency cooperation, Water policy, International law.
Identifiers: *Administrative regulations, *Coastal waters, *Contiguous zone, Territorial seas(Jurisdiction), FWPCA Amendments of 1972, Environmental policy, International agreements.

Presented are regulations and criteria promulgation by the Environmental Protection Agency to govern the application for, and the issuance of, permits for the transportation and dumping of material into ocean waters. The regulations enforce United States commitments made by ratification of the 'Convention on the Prevention of Marine Pollution by Dumping of Waste and Other Matter'. These criteria also satisfy the requirements of section 403(a) of the Federal Water Pollution Control Act Amendments of 1972, concerning guidelines for determining the degradation of the waters of the territorial sea, contiguous zone, and the oceans. The law prohibits the transportation from the United States, or by an agent of the U.S. outside the U.S., of any material covered by these regulations for purposes of dumping offshore without a permit from the EPA, or in the case of dredged material, from the U.S. Army Corps of Engineers. The dumping of certain materials such as chemical and biological warfare agents, high-level radioactive wastes, and fish wastes is not governed by these provisions. Included are specific provisions pertaining to the scope of the regulation, categories of permits, procedures for obtaining a permit, and the terms and conditions applicable to such permits. (Deckert-Florida)
W75-02959

EPA POLICY DIRECTIVES,
Pollution Control Guide, Vol 1, paragraph 2401-2411, p 2201-2204, 1973.

Descriptors: *Federal Water Pollution Control Act, *Planning, *Administrative agencies, *Water policy, *Water pollution control, Water pollution sources, Regulation, Water quality, State governments, Administration, United States, Effluents, Adoption of practices, Decision making, Waste water disposal, Water law, Water quality, Permits, Federal government, Water quality control, Water pollution, Water permits, Regulation, Pollution abatement, Water policy.
Identifiers: *National Pollution Discharge Elimination System, *FWPCA Amendments 1972, *Effluent limitations, *Administrative regulations.

Under the Federal Water Pollution Control Act (FWPCA) the Environmental Protection Agency (EPA) must initiate, organize, and establish activities, plans and programs by deadlines written into the FWPCA. A major responsibility of the EPA under the Act is the establishment of the National Pollutant Discharge Elimination System (NPDES). While the permit program of NPDES is the chief administrative tool to assure compliance with the discharge limitations, its development and operation is affected by the implementation of other provisions of the FWPCA, particularly the establishment of a continuing planning process within each state. Through this process effluent limitations based on water quality considerations will be generated for use in the permit program. No state may participate in the system without having an approved continuing planning process. With the importance of the interrelationships between the permit program and other programs established by the Act, the EPA has attempted to state these interrelationships and set priorities for the requirements of these programs. (Sperling-Florida)
W75-02960

PRETREATMENT STANDARDS,
Pollution Control Guide, Vol 1, paragraph 975-982, p 921-926, 1973.

Descriptors: *Pre-treatment(Water), *Industrial water, *Water quality standards, *Discharge(Water), *Federal government, Water law, Legal aspects, Waste water(Pollution), Water pollution, Water pollution control, Waste water treatment, Water pollution sources, Water pollution effects, Water pollution treatment, Water quality control, Quality control, Water treatment, Administrative agencies, Coordination, Governmental interrelations, Local governments, State governments, Federal Water Pollution Control Act, Water Quality Act.
Identifiers: *Pre-treatment standards(Effluent), *Administrative regulations, FWPCA Amendments of 1972, Environmental policy.

Presented are regulations promulgated by the Environmental Protection Agency establishing standards for pretreatment of pollutants introduced into publicly owned treatment works. The standards are designed to protect the operation of publicly owned treatment works and to prevent discharges of pollutants which pass through such works without adequate treatment. These standards are applicable to all non-domestic users of publicly owned treatment works, although additional provisions also have been established for major contributing industries. Violations of the pretreatment standards are enforceable directly against the industrial user. The state or municipality may impose more stringent standards where necessary to enable complicance with NPDES permits issued to the publicly owned treatment works, and pretreatment guidelines will be published by the EPA to assist them in establishing their own standards. Additional pretreatment standards for new users will be published at the same time EPA promulgates new source performance standards. Included are provisions dealing with notice requirements, user charges, prohibited wastes, pretreatment for compatible and incompatible pollutants, and time for compliance. (Deckert-Florida)
W75-02961

OBSTRUCTING AND POLLUTING FLOW OF WATER,
For primary bibliographic entry see Field 6E.
W75-02962

AUTHORIZING THE SECRETARY OF THE INTERIOR TO CONSTRUCT, OPERATE, AND MAINTAIN IN THE NARROWS UNIT, MISSOURI RIVER BASIN PROJECT, COLORADO,
House, Washington, D.C.
For primary bibliographic entry see Field 6E.
W75-02963

FEDERAL WATER POLLUTION CONTROL ACT--AMENDMENTS--LEGISLATIVE HISTORY,
For primary bibliographic entry see Field 6E.
W75-02964

COMMONWEALTH V. DERRY TOWNSHIP (ACTION FINDING TOWNSHIP IN CONTEMPT FOR NONCOMPLIANCE WITH D E R ORDER),
For primary bibliographic entry see Field 6E.
W75-02966

CITY OF NORTH MIAMI, FLORIDA V. TRAIN (ACTION BY CITY FOR DECLARATORY RELIEF, MANDAMUS AND INJUNCTION TO PREVENT APPROVAL OF FUNDING TO CONSTRUCT REGIONAL WATER FACILITIES),
For primary bibliographic entry see Field 6E.
W75-02967

WATER POLLUTION,
For primary bibliographic entry see Field 6E.
W75-02968

THE STATE OF ILLINOIS, ET AL. V. CITY OF MILWAUKEE (SUIT TO ABATE NUISANCE--DISPOSAL OF RAW SEWAGE IN NAVIGABLE WATERS).
For primary bibliographic entry see Field 6E.
W75-02973

UNITED STATES V. ASHLAND OIL AND TRANSPORTATION CO. (OIL DISCHARGE INTO NON-NAVIGABLE STREAM).
For primary bibliographic entry see Field 6E.

W75-02974

UNITED STATES V. GENERAL AMERICAN TRANSPORTATION CORP. (DISCHARGE OF REFUSE INTO NAVIGABLE WATERS).
For primary bibliographic entry see Field 6E.
W75-02975

REPORT OF PROCEEDINGS AT PUBLIC HEARING CONCERNING RECLASSIFICATION OF CERTAIN WATERS--THE UPPER CAPE FEAR RIVER BASIN (FROM SOURCE TO THE HARNETT-LEE COUNTY LINE), UPPER ROANOKE RIVER BASIN (FROM SOURCE TO CASWELL-PERSON COUNTY LINE), AND YADKIN-PEE DEE RIVER BASIN.
North Carolina Dept. of Natural and Economic Resources, Raleigh. Office of Air and Water Resources.
June 1, 1974. 100 p, 16 tab.

Descriptors: *North Carolina, *River regulation, *Water quality standards, *Classification, *Administrative agencies, Water law, Water policy, Water conservation, Water pollution, Water pollution control, Pollution abatement, Water quality control, Water utilization, Legislation, Water resources development, Regulation, Administration, River basins, River systems, Rivers, Streams, Tributaries, Legal aspects, Environmental effects, Decision making.
Identifiers: *Environmental policy, Effluent limitations.

This report contains copies of all written materials and a record of all comments and discussion presented during the public hearing April 24, 1974, on the proposed upgrading of classifications of certain waters in the Upper Cape Fear River Basin, Upper Roanoke River Basin, and Yadkin-Pee Dee River Basin. The hearing was conducted by the Water and Air Quality Control Committee of the North Carolina Board of Water and Air Resources. Comments were received from various representatives of federal, state, and local government and private citizens. Although general public reaction to the proposed reclassifications was favorable, several local government officials opposed the upgrading of certain streams due to the inability of their treatment facilities to comply with the more stringent effluent limitations. Included are the specific reclassification proposals, and the sections of the Laws of North Carolina relating to the state policy concerning its water resources and assignment of classifications to its surface waters. (Deckert-Florida)
W75-02976

REPORT OF PROCEEDINGS AT PUBLIC HEARING CONCERNING THE RECLASSIFICATION OF VARIOUS STREAMS IN THE BROAD, CATAWBA, FRENCH BROAD, HIWASSEE, LITTLE TENNESSEE, NEW AND WATAUGA RIVER BASINS.
North Carolina Dept. of Natural and Economic Resources, Raleigh. Office of Water and Air Resources.
June 1, 1974. 201 p, 7 tab.

Descriptors: *North Carolina, *River regulation, *Water quality standards, *Classification, *Administrative agencies, Water policy, Water law, Water conservation, Water pollution, Water pollution control, Pollution abatement, Water quality control, Legislation, Water resources development, Water utilization, Regulation, Administration, River basins, River systems, Rivers, Streams, Tributaries, Legal aspects, Recreation, Environmental effects, Decision making.
Identifiers: *Environmental policy.

Presented are copies of all written materials and a record of all comments and discussion presented during the public hearing March 12, 1974, on the proposed upgrading of classifications of certain waters in the Broad, Catawba, French Broad, Hiwassee, Little Tennessee, New and Watauga River Basins. The hearing was conducted by the Water and Air Quality Control Committee of the North Carolina Board of Water and Air Resources. Comments were received from various representatives of federal, state, and local government and private industry, as well as private citizens and citizen groups. While general public reaction to the proposed reclassifications was favorable, several local industries requested that the effective date of certain reclassifications be postponed to allow more time for necessary technological improvements to be made. Included are the specific reclassification proposals, and sections of the Laws of North Carolina pertaining to state policy concerning its water resources and the assignment of classifications to surface waters. (Deckert-Florida)
W75-02977

NUTRIENTS AND SUSPENDED SEDIMENTS FOR FORESTED WATERSHEDS IN THE EAST-CENTRAL SIERRA NEVADA,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 5B.
W75-02984

THE DEVELOPMENT OF AN AUTOMATED BIOLOGICAL MONITORING SYSTEM FOR WATER QUALITY,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology; and Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.
For primary bibliographic entry see Field 5A.
W75-02986

CONTROL OF ALGAE AT VANTAA RIVER BASIN,
Helsinki City Waterworks (Finland). Water Examination Bureau.
For primary bibliographic entry see Field 5C.
W75-02990

DESIGN OF ENVIRONMENTAL INFORMATION SYSTEMS.
Michigan Univ., Ann Arbor. School of Public Health.
For primary bibliographic entry see Field 6G.
W75-02992

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM.
Environmental Protection Agency, Washington, D.C.
Permit No MD 0053, December 5, 1974. 62 p.

Descriptors: *Federal Water Pollution Control Act, *Waste water, *Maryland, *Permit, *Regulation, Waste water disposal, Adoption of practices, Treatment facilities, Standards, Monitoring, Administrative agencies, Measurement, Environmental sanitation, Public health, Decision-making, Legislation, Industrial waste, Thermal pollution, Pollutants, Data collection, Navigable waters, Effluent.
Identifiers: *Administrative regulations.

This is an authorization to discharge in compliance with the Federal Water Pollution Control Act. The facility is located in Maryland. All discharges into the specified bodies of water must be in accordance with effluent limitations and monitoring requirements. The amount of discharge and its temperature will be measured. A required temperature range is provided. There shall be no discharge of floating solids or visible foam in other than trace amounts. Test procedures for the analysis of pollutants will conform to Environmental Protection Agency regulations. All records and data resulting from monitoring activities and analyses will be retained for a minimum of three years. The discharge of any pollutant identified in this permit as being in excess of that authorized will constitute a violation. All reasonable steps to minimize any adverse impact to navigable waters resulting from noncompliance with this point shall be taken. Officials of the state water pollution control agency shall be granted access to the premises where the effluent source is located. (Sperling-Florida)
W75-03000

AN INVESTIGATION OF THE FEDERAL, STATE, AND LOCAL OIL SPILL CONTINGENCY PLANS FOR THE LONG ISLAND SOUND AREA,
State Univ. of New York, Stony Brook. Marine Sciences Research Center.
S. T. Low.
Available from the National Technical Information Service, Springfield, Va 22161, as COM-73-11041, $7.00 in paper copy, $2.25 in microfiche. February 1973. 63 p, 1 tab, 18 append.

Descriptors: *Governmental interrelations, Disasters, *Oil spills, *Water pollution effects, *Waste water disposal, Area redevelopment, Regional development, Fuels, Water pollution sources, Oil pollution, Water pollution, Project planning, Local governments, Jurisdiction, Federal Water Pollution Control Act, Legal aspects, Legislation, *New York.
Identifiers: *Long Island Sound.

Various contingency plans for action in the event of an oil spill in the Long Island Sound area are examined in detail. Among those plans investigated are: the National Oil and Hazardous Substances Pollution Contingency Plan, formulated in compliance with the Federal Water Pollution Control Act; federal regional contingency plans; the New York State Water Quality Accident Contingency Plan; the Connecticut State Oil Spill Contingency Plan; and various local governmental contingency plans. The plans are examined for their legal authority, the geographic area of jurisdiction, the operational procedures, and their possible interaction with other contingency plans. Additionally, the biological aspects of oil pollution and techniques of oil pollution control and disposal are examined. (Craig-Florida)
W75-03002

LIVESTOCK WASTE MANAGEMENT SYSTEM DESIGN CONFERENCE FOR CONSULTING AND SCS ENGINEERS.
For primary bibliographic entry see Field 5D.
W75-03010

RULES AND REGULATIONS PERTAINING TO LIVESTOCK WASTE CONTROL,
For primary bibliographic entry see Field 5D.
W75-03011

RELATIONSHIP BETWEEN DIAMETER AND HEIGHT FOR THE DESIGN OF A SWIRL CONCENTRATOR AS A COMBINED SEWER OVERFLOW REGULATOR,
American Public Works Association, Chicago, Ill.
For primary bibliographic entry see Field 5D.
W75-03022

POLLUTION CONTROL--NOW AND IN THE FUTURE,
Purdue Univ., Lafayette, Ind. School of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-03028

ENVIRONMENTAL APPLICATIONS OF ADVANCED INSTRUMENTAL ANALYSES: ASSISTANCE PROJECTS, FY 73,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
For primary bibliographic entry see Field 5A.
W75-03041

THE INTEGRATED MULTI-MEDIA POLLUTION MODEL,
Georgetown Univ., Washington, D.C. Dept. of Economics.
For primary bibliographic entry see Field 5B.
W75-03045

RESEARCH AND DEVELOPMENT OF A SELECTIVE ALGAECIDE TO CONTROL NUISANCE ALGAL GROWTH,
Dow Chemical Co., Freeport, Tex.
For primary bibliographic entry see Field 5C.
W75-03046

WATER QUALITY INDEX APPLICATION IN THE KANSAS RIVER BASIN,
National Sanitation Foundation, Ann Arbor, Mich.
For primary bibliographic entry see Field 5A.
W75-03047

CRITIQUE OF ROLE OF TIME ALLOCATION IN RIVER BASIN MODEL,
North Carolina Univ., Chapel Hill. Center for Urban and Regional Studies.
For primary bibliographic entry see Field 6B.
W75-03052

REGIONAL GOVERNMENTAL ARRANGEMENTS IN METROPOLITAN AREAS: NINE CASE STUDIES,
Institute for Community Studies, Kansas City, Mo.
For primary bibliographic entry see Field 6E.
W75-03053

EXPERIMENTAL APPLICATION OF ALIQUAT-4 AND COPPER FOR CONTROL OF PONDWEEDS,
California State Dept. of Water Resources, Sacramento.
B. J. Archer, and R. Bachman.
Journal of the American Water Works Association, Vol 66, No 4, p 250-252, April, 1974. 1 fig, 2 tab.

Descriptors: *Copper sulfate, *Pondweeds, *Aquatic plants, *Reservoirs, *On-site tests, Public health, Streams, Monitoring, Analytical techniques, Spectroscopy, Testing procedures, *California.
Identifiers: *O'Neill Forebay(Calif), *Aliquat-4.

Copper sulfate was combined with Aliquat-4 to determine if this chemical combination could control pondweeds. These chemicals (alicop) were applied to a test plot in O'Neill Forebay, California and carefully monitored since there was a domestic and agricultural water contractor approximately 14 miles downstream of the application. This chemical combination appeared to provide some pondweed control and could be readily precipitated by bentonite clay. With an estimated effective alicop contact time of 2-3 hours, approximately 50% of all the aquatic pondweeds either were dead or showed signs of dying within ten days. Increasing either the contact time or the alicop concentration should increase the toxic effect of the treatment upon aquatic weeds. It is important to note that no fish were observed to be 'distressed' in the forebay or aqueduct during or after the application. (Jernigan-Vanderbilt)
W75-03056

A STUDY OF NATURALLY OCCURRING ALGICIDES PRODUCED BY FRESHWATER ALGAE,
Kentucky Water Resources Inst., Lexington.
D. O. Harris, and H. D. Caldwell.
Available from the National Technical Information Service Springfield, Va 22161 as PB-238 349, $3.75 in paper copy, $2.25 in microfiche. Research Report No 79, December 1974. 31 p, 4 fig, 3 tab, 29 ref. OWRT A-041-KY(2). 14-31-0001-3517, 14-31-0001-3817, 14-31-0001-4017.

Descriptors: Algal toxins, *Aquatic algae, *Algal poisoning, Aquatic weed control, Chlorophyta, Nuisance algae, *Algal control, Water pollution control, *Algicides, Water pollution effects.
Identifiers: Freshwater algae, Pond scum, Pandorina morum, Volvox globator.

The mode of action of the algicide produced by Pandorina morum was examined by exposing Volvox globator and isolates spinach chloroplasts to a partially purified algicide preparation. Oxygen evolution of Volvox, whole chloroplasts and broken chloroplasts (minus the Calvin cycle), was reduced indicating that the algicide inhibits the light reactions of photosynthesis. Oxygen evolution studies of other Volvocaceae confirmed the observation that Pandorina morum is not significantly influenced by its own inhibitor. Molecular weight approximation by gel filtration established that the inhibitor has a low molecular weight (probably below 100 mw). Field studies indicate that this algicide has tremendous potential as a control of nuisance algal growth. (Grieves-Kentucky)
W75-03084

JET-FORCED CIRCULATION IN WATER-SUPPLY RESERVOIRS,
Karlsruhe Univ. (Germany).
For primary bibliographic entry see Field 5B.
W75-03095

IMPACTS OF COLORADO RIVER SALINITY,
Colorado River Board of California, Los Angeles.
For primary bibliographic entry see Field 5C.
W75-03102

REMOTE SENSING REPORT, MAJOR WATERWAYS, MEMPHIS, TENNESSEE VICINITY.
National Field Investigations Center, Denver, Colo.
For primary bibliographic entry see Field 5B.
W75-03115

ECONOMIC AND ECOLOGICAL APPROACHES TO THE OPTIMAL LEVEL OF POLLUTION,
London Univ. (England). Dept. of Economics.
D. W. Pearce.
Discussion Paper No 7302, February 1973. 24 p, 7 fig, 19 ref.

Descriptors: *Pollution abatement, *Optimum development plans, *Economic impact, Pollutants, Control, Ecosystems, Succession, Cost-benefit ratio, Effects.
Identifiers: Zero pollution, Economic growth, Externalities.

The theoretical basis for two conflicting outcomes argued for by scientists (zero pollution) and economists (an 'optimal' level of pollution) is developed. Economists operating under this conventional wisdom treat pollution as a typical externality problem. Under the theory, pollution should be reduced to the point where the marginal benefits from pollution just equal marginal external costs to the sufferers. Examination under compensation criteria indicates that this solution is not typically the no-pollution level. Two economic arguments are discerned for continued growth. First, while growth may result in environmental decay, such costs are less than growth's benefits. Second, it is argued that as growth occurs, cleaner technologies are automatically induced. The ecological case for no pollution assumes that pollution causes changes (shocks) to the ecosystem which are perpetual and ever increasing and which prevent positive risks to man's survival. If the increased instability caused by the recurring and increasing shocks of pollution is functionally related to low survival probabilities, the pursuit of economic optimum is at the expense of increased probabilities of nonsurvival, a probability which should be minimized. A synthesis of the two arguments is also presented. (Schroeder-Wisconsin)
W75-03121

MAINE'S FRESH AND SALT WATER PLEASURE BOAT SERVICE INDUSTRY BOATING BUSINESS WORKSHOP, HELD AT HOLIDAY INN, AUGUSTA, MAINE, 26 MARCH 1973.
Maine Univ., Orono. Cooperative Extension Service.
For primary bibliographic entry see Field 6C.
W75-03123

THE DELINEATION OF AND FACTORS AFFECTING MISSISSIPPI COASTAL ESTUARIES AND TIDAL MARSHES,
Mississippi Univ., University. Dept. of Urban and Regional Planning.
C. E. Cook.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-10589, $4.25 in paper copy, $2.25 in microfiche. Sea Grant Publication No MSGP-71-002, November 1971. 69 p, 3 fig, 15 tab, 29 ref.

Descriptors: *Pollution abatement, *Coastal engineering, Coastal marshes, Estuaries, *Estuarine environment, *Environmental effects, Water utilization, *Mississippi, Land use, Land management, Planning.

The need to adopt stringent land use and environmental controls to protect Mississippi's coastal estuaries and tidal marshes is explored. Increased population and economic activities in the three Mississippi gulf counties have aggravated an already deteriorating ecology. Over the 1970-1990 period, population in the three county area is expected to double to 550,000 persons, with substantial increase in population densities expected. Industry in the area is also expected to grow with voluminous industrial water demands projected. Problems arising from increasing population and industrial activity are becoming more apparent. Increasing coliform and fecal coliform bacteria entering the estuaries have resulted in serious pollution of commercial oyster beds, and increased industrial and thermal wastes have caused serious damage to coastal estuaries. Eutrophication damage in the study area has also been found. Reclamation of Mississippi's tidal level speculative development. Indiscriminate spoilage placement has threatened water circulation patterns along the coast. Recommendations indicate that this spoilage from dredging and present solid waste dumping practices within the estuary should be curtailed to limit existing ecological disruption. Greater cooperation among state, local and county authorities and improved environmental control regulations and better land use planning are also required. (Schroeder-Wisconsin)
W75-03124

SIMULATION OF MINIMUM ENVIRONMENTAL AND ECONOMIC DISPATCH OF POWER,
National Center for Energy Management and Power, Philadelphia, Pa.
L. Eisenberg.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-227 901, $3.75 in paper copy, $2.25 in microfiche. July 1973. 29 p, 4 tab, 6 fig, 5 ref. GI 29729.

Descriptors: *Cost analysis, *Economic impact, *Pollution abatement, Air pollution, Water pollution, Electric power production, Electric power-plants, Electric power costs, Nitrogen compounds, Sulfur compounds, Thermal pollution.
Identifiers: Particulates.

The cost of producing power according to minimum emission or environmental constraint is developed and the results are compared to those obtained from the economic dispatch of power. The comparison is accomplished through a computer simulation of an actual large power system having a capacity of 7.131 Mw. Generators utilized in the simulation include conventional and pumped by hydro facilities, nuclear, coal and oil fired steam generating plants, and oil burning combustion turbines. The simulation minimized only one type of pollutant at a time. The four pollutants considered were: sulfur oxides, nitrogen oxides, particulates, and thermal emissions. To meet minimum emission constraints for sulfur oxides while satisfying a yearly peak demand of 5300 Mw, a 76% decrease in the emitted pollutant was accomplished at an increase in costs of 52%. The over 12,000 ton reduction of Wo sub x emissions required to meet minimum standards was found to increase annual costs by $236,277,000. For the particulate emission case costs rose by 52% to $282,844,000 to reach a 59% reduction in emissions. Thermal emissions were also reduced to 41,638,000 MBTU at a cost of $269,373,000, a 44.3% increase. (Schroeder-Wisconsin)
W75-03127

HYDROLOGIC RELATIONSHIP OF JEFFERSON COUNTY LANDFILL LEACHATE AND MERAMEC HEIGHTS AREA SPRINGS,
National Field Investigations Center, Denver, Colo.
For primary bibliographic entry see Field 5B.
W75-03128

POLLUTION CONTROL COSTS AND RESEARCH PRIORITIES IN THE ANIMAL SLAUGHTERING AND PROCESSING INDUSTRIES.
National Industrial Pollution Control Council, Washington, D.C.
Poultry and Animal-Based Products Foods Sub-Council Report, May 1973. 27 p, 1 tab.

Descriptors: *Pollution abatement, *Industrial wastes, Economic impact, Recycling, *Water pollution control, Air pollution, *Cost analysis.
Identifiers: Meat industry, Poultry industry, Rendering industry.

In September 1972, five trade associations in the meat, poultry, and rendering industries conducted a survey among their membership to assess the economic impact of existing and proposed pollution controls. Results suggest that during the 1971-76 period these industries have or will expend a total of $222 million in capital investments ($100,127; $71,850; and $50,070 million for the meat, poultry, and rendering firms, respectively) and $162,155 million in total operating and administrative costs ($75,185; $41,300; and $45,670 million, respectively). Economic benefits arising from the sale of recoverable by-products resulting from pollution control practices have been minimal, averaging about two percent of the average annual capital costs for each of the respective industries. Industry estimates also indicatate that a minimum of 124 rendering and poultry slaughtering plants, representing nearly $23 million in capital investment, may be forced to close because of an inability to meet proposed standards. Nine areas of priority research are suggested to improve pollution control management in these industries. These include development of better in-plant controls, improved odor control, disposal methods for ground and paunch manure, and new waste recovery treatment and by-product development techniques. (Schroeder-Wisconsin)
W75-03137

COSTS AND BENEFITS OF THE ABATEMENT OF POLLUTION OF BISCAYNE BAY, MIAMI, FLORIDA,
Miami Univ., Coral Gables, Fla.
R. M. Sampedro.
Available from the National Technical Information Service, Springfield, Va 22161, as COM-73-10785, $5.25 in paper copy, $2.25 in microfiche. University of Miami Sea Grant Technical Bulletin No 24, December 1972. 101 p, 6 fig, 10 tab, 27 ref, 3 append. NOAA SG-2-35147.

Descriptors: *Regional development, *Cost-benefit analysis, *Pollution abatement, *Water pollution, *Water quality, Waste water treatment, *Florida, Sanitary engineering, Municipal wastes, Recreation demand, Benefits.
Identifiers: Dade County(Fla).

The master plan to improve water quality in Florida's Dade County includes closing several small waste water treatment plants presently discharging into inland water ways, suspending septic tank installment permits, and constructing a larger (50 to 80 m.g.d.) plant with high BOD removal efficiencies that will discharge into the Atlantic Ocean and the Gulf Stream. Smaller plants will be converted into pumping stations to larger plants, and additional transmission lines and electrical hookups to firms presently discharging into surface water will be added. Estimates, covering initial and ultimate capital and operating costs, indicate totals ranging from $992,605 to $1,038,691 million assuming a six per cent discount rate and $668,119 to $706,841 million under a 12 per cent rate for the 15 alternative plans evaluated. Total recreational benefits resulting from these proposed plans are also estimated by utilizing the predicted upper limits of the total recreational capacity of the bay. If Dade County recreationalists value a picnic lunch and a swim at $1/day and alternative boating activities at $89 to $92/day, benefit will just cover cost utilizing the six per cent discount rate. Results of a waste source survey determining the efficiency of 67 plants and of pollution levels at 48 sampling stations within the bay are presented. (Schroeder-Wisconsin)
W75-03140

LOUISIANA SUPERPORT STUDIES. REPORT 3. RECOMMENDATIONS FOR THE ENVIRONMENTAL PROTECTION PLAN,
Louisiana State Univ., Baton Rouge. Center for Wetlands Resources.
For primary bibliographic entry see Field 6G.
W75-03183

SOURCES CHARACTERISTICS OF LIQUID AND GASEOUS EFFLUENTS FROM FERTILIZER PLANT,
Fertilizer Corp. of India, Trombay.
For primary bibliographic entry see Field 5B.
W75-03188

THE MARINE ENVIRONMENT--USE AND ABUSE, ORDER OR CONFLICT--PART 1,
Aquamarine International Ltd., London (England).
M. B. F. Ranken.
Journal of the Society of Environmental Engineers, Vol 13-1, No 60, p 3-11, March, 1974. 1 tab.

Descriptors: *Sea water, *Water pollution effects, *Water pollution sources, Industrial wastes, Sewage, Farm wastes, Rivers, Estuaries, Fishkill, Water pollution control, Environmental effects, Domestic wastes, Water supply.
Identifiers: London(England-UK).

The causes and effect of pollution in the sea are discussed in a comprehensive review of the marine environment. The most important effects of pollutants are biological; the sea is a highly effective scavenger of many pollutants, but its capacity to break down and neutralize them is not infinite. A great many pollutants come from sewage outfalls and industrial discharges into the tidal waters, often uncontrolled and illegal; from rivers; from the atmosphere brought down by rain; from agricultural runoff; from dumping from ships; from exploitation of natural resources; and from other sources. In pollution abatement a difficult and delicate balance must be achieved between the cost of what is done to reduce or abate the pollution and the losses caused by not doing so. There is easy access to the sea for any industry located on an estuary or along the coast. The aim in estuaries must be to reduce pollution to levels at which the bottom can support the fauna needed for sea fish, and at which migratory fish can pass up or down river, whatever the river or tidal levels. Some of the pollutants entering the sea are listed. (Merritt-FIRL)
W75-03198

ENVIRONMENTAL VALUES IN DECISION MAKING: PORT JEFFERSON AS A CASE STUDY,
Grumman Ecosystems Corp., Bethpage, N.Y.
For primary bibliographic entry see Field 6G.
W75-03225

STATUS OF CONSTRUCTION FOR ENVIRONMENTAL PROTECTION,
Bureau of Domestic Commerce, Washington, D.C. Construction, Water Resources and Engineering Services Div.
For primary bibliographic entry see Field 5D.
W75-03226

INTEGRATING WATER QUALITY AND WATER RESOURCES PLANNING,
Office of Land Use and Water Planning, Washington, D.C.
J. A. Kruivak.
Journal of Hydraulics Division, Proceedings of the American Society of Civil Engineers, Vol 100, No HY9, p 1257-1262, September 1974.

Descriptors: *Water resources development, *Water quality control, *Water policy, *Water supply, Federal project policy, Project planning, Regulation, Multiple-purpose projects, Legislation.

The basis for water resources planning and water quality planning are discussed. Deficiencies in water planning relate to the fact that both water resource and water quality planners often operate without information about the needs and intentions of those who are planning for such things as land use, transportation, housing, and industrial development. Evidence showing that movement toward integrated water planning is beginning includes the joint planning programs and multiple-purpose water development plans formulated by various land and water agencies together at the Federal level and the strong state programs for water planning that have been encouraged by new Federal legislation. Problems of integrating water planning, in both quantity and quality, are technical, behavioral, and institutional. Suggestions for improving water planning include: a more coordinated and stabilized system of intergovernmental relations; a more formal recognition of the positive contributions available from citizen involvement in the decision-making process; a formalization of procedures for determining the goals of water planning; a better syntheses of the highly specialized but separated areas of knowledge; and, more receptivity demonstrated by the planning profession toward the desires of the public. (Orr-FIRL)
W75-03227

SIMPLE SOIL WATER SIMULATION MODEL FOR ASSESSING THE IRRIGATION REQUIREMENTS OF CITRUS,
Volcani Inst. of Agricultural Research, Bet-Dagan (Israel). Div. of Agricultural Meteorology.
For primary bibliographic entry see Field 3F.
W75-03228

EFFICACY OF SPECIFICALLY-DEVELOPED PETROLEUM HYDROCARBONS AS ANOPHELES CONTROL AGENTS,
Texas Univ., Galveston. Medical School.
D. W. Micks, and G. V. Chambers.
Am J Trop Med Hyg, Vol 23, No 2, p 270-273, 1974, Illus.
Identifiers: *Anopheles control, Anopheles-albimanus, Anopheles-quadrimaculatus, Environmental studies, Insecticides, Larvicides, *Malaria control, Pollution, Toxicity, Vector, Wildlife, Hydrocarbons, Organic compounds, *Vector control agents.

During the past few years, it has become increasingly apparent that the ecologic and other implications of insecticide usage in malaria control programs are such that residual adulticides can no longer be relied upon as the only control measure. As part of a long-term program designed to develop superior vector control agents, 3 recently-developed petroleum derivatives which have a very low order of toxicity to fish, wildlife and humans were evaluated in the laboratory. Applications to the water surface at the rate of 0.5-1 gal/acre (4.6-9.35 l/ha) resulted in virtually complete mortality of Anopheles quadrimaculatus and Anopheles albimanus larvae, depending upon the instar. The A. albimanus larvae were somewhat more susceptible. Application rates of 0.25-0.5 gal/acre (2.4-4.6 l/ha) produced complete kills of pupae of both species. Such petroleum-based larvicides can appropriately be integrated into malaria control programs as an adjunct to intradomiciliary treatments, in areas where residual applications to dwellings are not used, where the vectors are exophagic, in areas of restricted breeding, where resistance has rendered residual adulticides ineffective, and where environmental safety is important.--Copyright 1974, Biological Abstracts, Inc.
W75-03266

REGULATION OF GREAT LAKES WATER LEVELS--APPENDIX B--LAKE REGULATION, VOL 1,
International Joint Commission-United States and Canada. Great Lakes Levels Board.
For primary bibliographic entry see Field 2H.
W75-03277

POLLUTION--APPLICABILITY OF CHAPTER 376, FLORIDA STATUTES, TO SUBSTANCES OTHER THAN THOSE SPECIFICALLY LISTED,
For primary bibliographic entry see Field 6E.
W75-03278

PROPOSED REGULATIONS FOR THE DISPOSAL OF WASTEWATER IN SUBDIVISIONS.
Missouri Clean Water Commission, Jefferson City.
1974. 5 p.

Descriptors: *Waste water disposal, *Sewage disposal, *Waste water(Pollution), *Ultimate disposal, Legislation, Legal aspects, Missouri, Waste dilution, Sanitary engineering, Water quality, Water quality control, Water demand, Water supply, Water pollution sources, Regulation, Water pollution control, Pollution abatement, Sewage, Sewage treatment, Sewers.
Identifiers: Administrative regulations.

These proposed regulations deal with the disposal of wastewater in subdivisions of more than 10 dwellings, within the state of Missouri. The regulations will apply to developers who own or control 10 or more contiguous lots. The regulations also call for anyone controlling a single dwelling wastewater treatment facility to eliminate it and connect the dwelling to a municipal sewage system. A report to the Missouri Clean Water Commission is required of any person subject to the requirements of the regulations. It should be prepared by an engineer outlining plans for the disposal of wastewater within the subdivision. This report must comply with five specific requirements which are outlined. Written approval of the developer's plans must be obtained from the Commission and time periods are established for approval or disapproval. All damages, penalties and other agency action will be as provided by the Missouri Clean Water Law. (Sutton-Florida)
W75-03279

MR. JUSTICE DOUGLAS, DISSENTING,
For primary bibliographic entry see Field 6E.
W75-03280

OIL AND PUGET SOUND,
For primary bibliographic entry see Field 5C.
W75-03281

EXPERIMENTAL SIMULATION OF STOCHASTIC STREAM RESPONSE TO THERMAL INPUTS AND APPLICATION OF SPECTRAL ANALYSIS TECHNIQUES,
Kansas State Univ., Manhattan. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W75-03296

RAW MATERIALS TRANSPORTATION COSTS AND THEIR INFLUENCE ON THE USE OF WASTEPAPER AND SCRAP IRON AND STEEL, VOLUME II, APPENDICES,
Resource Planning Inst., Cambridge, Mass.
J. F. Foran, A. T. Heenan, and R. G. Schweikhardt.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-229 817, $4.75 in paper copy, $2.25 in microfiche. Report No RI-73-1, April 1974. 93 p, 58 tab, 15 ref. EPA R801678.

Descriptors: *Transportation, *Steel, *Costs, Railroads, Boats, Roads, Cost comparisons, Rates, Forest management, Iron, Industries, Industrial wastes, Pollutants.
Identifiers: Virgin steel, Secondary material.

A compilation of tables and graphs providing a data base to examine the transportation revenues and rates for virgin and secondary materials in the steel and paper industries in rail, motor and water carrier industries is presented. Statistics collected include domestic waterborne commerce on major inland waterways for 1971, the amount of virgin and secondary steel and paper raw materials transported by each over the 1956-1971 period, railroad and motor carrier commodity statistics, and steel production by method over the 1969-1980 (projected) period. Maps illustrate varying railroad and motor carrier territories, districts and regions, and waterways of the United States. Commodity price graphs, inland water carrier freight rates, class I motor carrier revenues and loading data, and steel raw materials, paper and paperboard raw materials are also presented. (Schroeder-Wisconsin)
W75-03299

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

WATER RESOURCE DEVELOPMENT AND ENVIRONMENT: AN APPROACH TO IMPACT ANALYSIS,
Waterloo Univ. (Ontario). Dept. of Man-Environment Studies.
D. W. Fischer, and G. R. Francis.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 264-269.

Descriptors: *Analytical techniques, *Environment, *Investigations, Water resources development, Analysis, Planning, Management, Water management(Applied), Economics, Social aspects, Decision making.

An overall scheme of systematically assessing environmental impacts was outlined. The principles set forth were: (1) environmental considerations should be incorporated and fully integrated at each stage of the entire planning and decision process, (2) provisions need to be made to monitor the range of environmental effects of water management activities, and (3) the scheduling and phasing of a water management program must reflect the time needed to obtain required environmental information. In applying these principles planners should address their efforts to outside consultation and environmental impact analysis. (See also W75-02751) (Jess-ISWS)
W75-02774

OPTIMAL ALLOCATION OF WATER QUALITY CONTROLS IN URBANIZING RIVER BASINS,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5G.
W75-02908

A PRELIMINARY INPUT-OUTPUT WATER PLANNING MODEL FOR HAWAII,
Hawaii Univ., Honolulu. Water Resources Research Center.
J. E. T. Moncur.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 345, $3.75 in paper copy, $2.25 in microfiche. Technical Memorandum Report No 40, June 1974. 46 p, 11 tab, 11 ref, append. OWRT A-037-HI(1). 14-31-0001-3811.

Descriptors: *Hawaii, *Input-output analysis, *Model studies, Economics, *Water requirements, Water demand, *Computer programs, Water utilization, *Projections, *Planning, Water supply, Forecasting.

At present most water planning and forecasting done by the Oahu Board of Water Supply is based on projections of population and per capita water 'demand'. It is not population, per se, however, which determines demand for water. Rather, price, income, demographic aspects, and the interrelated economic activities underlie the water use patterns of the region's population. The latter of these attributes is the subject of input-output analysis. A recently completed input-output model for the State of Hawaii is adapted to serve as a water supply planning device. Although proper water use data is not now available for most significant water-using sectors, some rough estimates, borrowings from other states, and a few outright guesses serve to illustrate and interpret the model. An extensive and rather general set of computer programs is a major product of the project. These

programs produce four basic input-output tables--a transactions matrix, a direct requirements matrix, a direct + indirect requirements matrix, and a direct + indirect + induced requirements matrix--given the direct requirements matrix and the final demand levels. Standard income and employment multipliers are produced. Finally, water sector subroutines calculate a gross water use interactions matrix and several measures of direct and of direct + indirect water use coefficients and multipliers.
W75-02979

RIVERINE RECREATIONAL DEVELOPMENT-MATHEMATICAL MODELING,
Carnegie-Mellon Univ., Pittsburgh. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-02985

THE INTEGRATED MULTI-MEDIA POLLUTION MODEL,
Georgetown Univ., Washington, D.C. Dept. of Economics.
For primary bibliographic entry see Field 5B.
W75-03045

CRITIQUE OF ROLE OF TIME ALLOCATION IN RIVER BASIN MODEL,
North Carolina Univ., Chapel Hill. Center for Urban and Regional Studies.
For primary bibliographic entry see Field 6B.
W75-03052

6B. Evaluation Process

ENVIRONMENTAL ASSESSMENT: AN AID IN WATER RESOURCE MANAGEMENT,
Battelle Memorial Inst., Columbus, Ohio.
For primary bibliographic entry see Field 6G.
W75-02761

SOME NECESSARY CONDITIONS FOR EQUILIBRIUM AMONG MANKIND, ENVIRONMENT, AND ECONOMY,
Illinois State Environmental Protection Agency, Springfield. Div. of Water Pollution Control.
L. K. Sinha.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 134-143. 2 fig, 10 ref.

Descriptors: *Decision making, *Management, *Planning, Environment, Equilibrium, Constraints, Human population, Technology, Social aspects, Economics.
Identifiers: Decision makers, Action agency.

Recognizing the need of multi-disciplinary efforts to understand and prepare for a period of great transition from growth to global equilibrium, some of the conditions necessary for equilibrium among mankind, environment, and economy were identified. A triangle of decision making processes, which is very general in nature and a slight deviation from the traditional decision making processes, was utilized to illustrate a concept where people can become an active part of the decision making process without being able to sway the fulcrum with non-rational influences on the decision maker. Further, a triangle of life is used to emphasize the need of an extensive effort to guide the desires and activities of growing populations. (See also W75-02751) (Adams-ISWS)
W75-02762

ENVIRONMENTAL CONSIDERATIONS IN WATER RESOURCES DEVELOPMENT,
Bureau of Reclamation, Denver, Colo.
For primary bibliographic entry see Field 6G.
W75-02763

PLANNING, MANAGEMENT AND FINANCING OF INTERSTATE RIVER VALLEY PROJECTS IN INDIA,
Madhya Pradesh (India). Irrigation Dept., Bhopal.
D. S. Sinha.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. p 166-179, 4 fig.

Descriptors: *Water resources development, *Inter-basin transfers, *Political aspects, *Interstate rivers, *Water management(Applied), Planning, Irrigation, Hydroelectric plants, Flood control, Riparian rights, Hydrologic data, Reservoir yield.
Identifiers: *India(Madhya Pradesh-Narmada River), Control boards, Damodar Valley Corporation.

Several Indian rivers flow through more than one state. According to Indian Constitution each state is competent to impound its own water. This has led to a number of problems. When an upper state harnesses a river for irrigation, it affects the river supplies lower down. Also, when a lower state builds a reservoir, an irrigation right is created and the upper state cannot intercept that water. A number of water disputes have arisen about the river waters of Madhya Pradesh which is at the head of several river systems. Three such disputes are described. India first experimented on the TVA concept by creating Damodar Valley Corporation to handle interstate disputes. Opinions were expressed that the results achieved were not commensurate with the autonomy vested in the Corporation. Later, control boards were created for big projects, like Bhakra Nangal and Hirakud Dam. The central government as well as the state governments in dispute are represented on these boards. The state governments agree to implement all the decisions of the board. When only two states are involved, bilateral control boards have been created. Experience has shown that the bilateral arrangement works very well. (See also W75-02751) (Singh-ISWS)
W75-02765

SOCIOECONOMIC IMPACTS OF THE FEDERAL RECLAMATION PROGRAM IN THE UNITED STATES,
Bureau of Reclamation, Washington, D.C. Div. of Water and Land.
A. D. Nielsen, and L. D. Walker.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 180-188. 1 tab, 9 ref.

Descriptors: *Reclamation, *Economics, *Social impact, *Water resources development, *Project planning, Management, Planning, Environment, Economic impact, Monetary benefits, Construction, Investment, Hydroelectric power.
Identifiers: Bureau of Reclamation.

The Bureau of Reclamation program of planning, development, and management of water resource projects generates significant national, regional, and local socioeconomic impacts throughout the United States. These effects are derived from two general sources: (1) the immediate impact from construction activity; and (2) recurring social, environmental, and economic impacts from project operation. Consturction activity creates a demand for a large variety of products and services that affect many industries and a wide number of occupational groups. Once construction is completed and projects go into service, they generate a steady stream of annual monetary and nonmonetary benefits. Other positive impacts on the social and environmental quality of life are made through enhancement of recreational potentials, fish and wildlife habitat, and improved public services. A total federal investment of $5.5 billion in completed project facilities during the last 70 years has resulted in a net increase in economic activity of $4.3 billion each year to the nation. Development of hydroelectric power led to the establishment of major aluminum and phosphate industries. Availability of irrigation water has greatly improved the economy of many states, for example, Nebraska. (See also W75-02751) (Singh-ISWS)
W75-02766

PRICE AND OTHER SELECTED ECONOMIC AND SOCIO-ECONOMIC FACTORS AS DETERMINANTS OF HOUSEHOLD WATER CONSUMPTION,
Mississippi Univ., University. Dept. of Economics.
W. J. Primeaux, Jr., and K. W. Hollman.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 189-198. 3 tab, 4 ref. OWRT A-064-MISS(3).

Descriptors: *Economics, *Domestic water, *Regression analysis, *Education, Lawns, Water rates, Market value, Elasticity of demand, Swimming pools, Municipal water, Precipitation(Atmospheric), Statistics, Pricing, *Mississippi.
Identifiers: *Residential water consumption.

The effect that price and other selected economic and socioeconomic variables have on the quantity of water use in residential households in northern Mississippi was determined with the use of multiple regression analyses. The sample consisted of 14 cities, ranging in size from about a 5500 to 21,000 population in largely rural counties. Water systems in the selected cities has the same type of ownership and method of operation. The study group comprised 402 single family households randomly chosen from and distributed fairly even among the 14 cities. The most dominant explanatory variables by rank according to the statistic of partial coefficient of determination were number of persons per residence, pool price irrigable lawn area, and education. Race and age showed no influence on water consumption when all other factors were constant. The best estimating equation contained 11 variables and explained 56.47% of the variance of quantity of water demanded by the residences. However, with only three variables, number of people, market value, and price of water, the variance explained was 52.5%. The price elasticity coefficient of 0.26 calculated from the regression is highly inelastic for the current relevant range of water prices of $0.30 to $1.65 per 1000 gallons. (See also W75-02751) (Singh-ISWS)
W75-02767

WATER SUPPLY/SEWERAGE--A REQUIRED SOCIAL OVERHEAD FACILITY IN DEVELOPING COUNTRIES,
Camp, Dresser and McKee International, Inc., Boston, Mass.
L. V. Gutierrez, Jr.
In: Water for Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 199-208. 1 fig, 4 ref.

Descriptors: *Water supply, *Sewerage, *Social aspects, *Planning, Water quality, Human populations, Facilities, Economics, Water resources, Public utilities, Local governments, Management, Urbanization, Construction, Water supply development.
Identifiers: *Developing countries.

Guidelines for the implementation of a realistic, staged construction program of water supply and sewerage facilities in developing countries were

proposed. Based on the definite need for improvement, expenditures on such facilities should be considered a primary social investment, aided by government subsidy. In needy communities, government subsidy will make up the difference between annual capital, operating costs, and the 'paying ability' of the consumer or user. However, construction alone will not solve the problems. It is also necessary to provide competent and skilled operators, supported by concerned managers. (See also W75-02751) (Scott-ISWS)
W75-02768

EVALUATION OF THE BENEFITS OF RURAL WATER SUPPLY PROJECTS IN TANZANIAN VILLAGES,
Duke Univ., Durham, N. C. Dept. of Civil Engineering.
D. Warner.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 209-219. 5 tab, 4 ref.

Descriptors: *Water supply, *Water resources development, *Africa, Planning, Benefits, Evaluation, Rural areas, Water consumption, Data collections, Water supply, Public health.
Identifiers: *Tanzania, *Village water supply, Field study.

A field study made in Tanzania from 1968-1970 identified, measured, and evaluated benefits arising from rural water supply projects in East Africa. Empirical data from fifteen villages were collected to determine the effects of improved water supplies. The results of the field study were used to determine implicit priorities of development objectives, and in turn, to formulate suggested methods of projects planning and evaluation. The results show that villages with improved water supplies ranked higher than those without. Where villages with water projects were involved, the technical improvements were either not utilized by the people or did not bring about significant changes in their water use patterns. Where villages without water projects were involved, the water use patterns of the people, and the corresponding benefits thereof, were influenced either by an unsuccessful attempt at a water project in the village or proximity to a successful water project in an adjacent village. (See also W75-02751) (Roberts-ISWS)
W75-02769

IMPACT OF TRADITIONAL WATER RESOURCES TECHNOLOGY ON THE HUMAN ENVIRONMENT,
State Univ. of New York, Syracuse. Coll. of Environmental Science and Forestry.
For primary bibliographic entry see Field 6G.
W75-02773

AN APPROACH TO ASSESSING ENVIRONMENTAL IMPACTS,
Waterloo Univ. (Ontario). Dept. of Man-Environment Studies.
For primary bibliographic entry see Field 6G.
W75-02775

WATER RESOURCES DEVELOPMENT AND FLOOD CONTROL ALONG THE DANUBE RIVER,
Technical Univ. of Budapest (Hungary). Inst. of Water Management and Hydraulic Construction.
For primary bibliographic entry see Field 4A.
W75-02777

THE RHINE-MAIN-DANUBE CONNECTION--A WATERWAY FOR EUROPE,
Rhein-Main-Donau A.G., Munich (West Germany). Managing Board.
For primary bibliographic entry see Field 4A.
W75-02778

WASTEWATER RECLAMATION AND REUSE IN ISRAEL,
Technion - Israel Inst. of Tech., Haifa (Israel).
For primary bibliographic entry see Field 5D.
W75-02779

WASTEWATER RECLAMATION AND REUSE IN THE SUISUN MARSH CALIFORNIA, U.S.A.,
Bureau of Reclamation, Sacramento, Calif.
For primary bibliographic entry see Field 5D.
W75-02780

THE POTENTIAL POLLUTION INDEX AS A TOOL FOR RIVER WATER QUALITY MANAGEMENT,
International Reference Centre for Community Water Supply, The Hague (Netherlands).
For primary bibliographic entry see Field 5A.
W75-02781

THE EFFECT OF SELF PURIFICATION OF FLOWING WATER,
Seoul National Univ. (Republic of Korea). Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-02782

MARINE AQUACULTURE: PROBLEMS AND PROSPECTS,
Food and Agriculture Organization of the United Nations, Rome (Italy). Dept. of Fisheries.
C. P. Idyll.
Journal of the Fisheries Research Board of Canada, Vol 30, No 12, Pt 2, p 2178-2183, December, 1973.

Descriptors: *Aquaculture, *Foods, Investigations, Animal pathology, Animal behavior, *Research and development, Artificial substrates, *Fisheries.

Aquaculture is the technique of raising useful aquatic species under some control of the organism and its environment. It is expected to supplement fishing by adding significantly to supplies of protein food, but it is unlikely that it will ever replace fishing as the principal means of exploiting the sea. Discussions are often confused because there are a number of distinctly different procedures embraced by the term aquaculture, with different chances of development into major industries. Aquaculture has developed with very little help from scientists, and the solution of technical and engineering problems would advance its rate of development greatly. The kinds of problems that should be solved include: the search for species suitable for culture; research on nutrition of cultured animals and development of suitable food; pathology of cultured animals; studies on the behavior of cultured animals; engineering studies; studies of pollution and the use of waste substances and heat; legal research; economic and social research. It is proposed that a small number of regional centers for aquaculture be established to study the most pressing problems. (Sandoski-FIRL)
W75-02853

OBJECTIVES AND PROBLEMS OF MANAGING AQUATIC LIVING RESOURCES,
National Marine Fisheries Service, Seattle, Wash. Northwest Fisheries Center.
D. L. Alverson, and G. J. Paulik.
Journal of the Fisheries Research Board of Canada, Vol 30, No 12, Pt 2, p 1936-1947, December, 1973. 52 ref.

Descriptors: *Administration, *Aquatic productivity, *Fish management, Economic efficiency, Regulation, *Fisheries.

In the management of aquatic living resources, conservation objectives are largely concerned with 'rational use' concepts, while socioeconomic goals may be associated with economic efficiency, resource development, and allocation of resources between user groups. A number of problems confront managers of aquatic living resources. They include the rapidity of the changes occurring in fisheries, conflicting objectives, the fragmented and limited jurisdiction of management agencies, adequacy of scientific input into management decisions, difficulties of enforcement, and multiple use interest. Improved management of aquatic living resources will require decision-making machinery that is responsive to the dynamic character of modern fisheries, systems to resolve potential conflicts in human values, a commitment of governments, managers and scientists to assume the responsibilities delegated to them, including the promulgation and enforcement of appropriate regulations, and a recognition on the part of management that they cannot expect scientific unanimity or certainty regarding the status of fish stocks and the nature of the actions required to ensure their productivity. (Sandoski-FIRL)
W75-02869

PROCEEDINGS OF CONFERENCE ON WATER RESOURCES PROBLEMS AND RESEARCH NEEDS IN NORTHEASTERN MINNESOTA.
Minnesota Univ., St. Paul. Water Resources Research Center.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-238 309, $3.75 in paper copy, $2.25 in microfiche. December 1973. 31 p. OWRT A-028-MINN(9). 14-31-0001-4023.

Descriptors: *Water resources, *Minnesota, *Research priorities, *Comprehensive planning, *Conferences, Project planning, Multiple-purpose projects, Lake Superior.

The Water Resources Research Center, University of Minnesota, is developing a long-range comprehensive plan for water resources research in Minnesota involving Federal, State and local agencies, private organizations, Consultants, University of Minnesota, State and private Colleges, Interest Groups, and citizens. An attempt is being made to formulate broad research guidelines by inventorying research needs and assigning priorities. The object of this Conference was to identify research needs and priorities for northeastern Minnesota. Conference participants identified the following high priority needed water resources research topics: Ecological and health impacts associated with taconite tailings discharges into Lake Superior; development of a water resources information system for the Lake Superior basin; establishing unique water quality criteria and standards for the Lake Superior basin; impacts of land use practices on water quality; methods for solving sewage disposal problems involving Duluth-Superior metropolitan area, small municipalities, individual septic tank systems, and water-borne navigation; techniques for coordinating water resources research efforts; and economic-social input/output analysis for Lake Superior basin. (Walton-Minnesota)
W75-02885

MINNESOTA WATER AND RELATED LAND RESOURCES POLICIES WITH EMPHASIS ON THE 68TH LEGISLATIVE SESSION,
Minnesota Univ., St. Paul. Water Resources Research Center.
For primary bibliographic entry see Field 6E.
W75-02886

ROLE OF THE SCIENTIST TECHNICIAN IN WATER POLICY DECISIONS AT THE COMMUNITY LEVEL: A STUDY IN PURPOSIVE COMMUNICATION,
Minnesota Univ., Minneapolis. Dept. of Rural Sociology.

R. E. Rickson.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-238 314. Minnesota Water Resources Research Center, St. Paul. December 1974. 38 p, 14 tab, 6 ref. OWRT B-067-MINN(1).

Descriptors: *Community development, *Attitudes, Social aspects, *Decision making, Communication.

The objective was to increase understanding of how scientific knowledge may be most effectively applied to community problem-solving. The report focused on how certain community characteristics affect public perspective of science and the role of the scientist in solving water resources problems; and, the degree of consensus between perspectives and local leaders about science and the role of the scientist in defining and solving water problems. (Waelti-Minnesota)
W75-02888

WATER-ORIENTED REGIONAL RECREATION OPPORTUNITIES FOR OKLAHOMANS,
Oklahoma State Univ., Stillwater. Dept. of Geography.
R. D. Hecock, and J. F. Rooney, Jr.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-238 376, $5.25 in paper copy, $2.25 in microfiche. Completion Report Oklahoma Water Resources Research Institute, Stillwater, November 1974. 100 p, 26 fig, 9 tab, 26 ref, 4 append. OWRT B-026-OKLA(1).

Descriptors: *Oklahoma, *Recreation demand, Recreation, *Evaluation, Social participation, Recreation facilities, *Regional analysis, *Planning.

The project identifies present patterns of water-oriented and other recreational resources in Oklahoma. Resources are evaluated relative to their worth as recreational opportunities for the people of Oklahoma. Several new techniques are presented to assess demand and shared use of resources. The extent to which planned increments to the water recreational resource base will alter recreational opportunities of Oklahomans is evaluated. A great number of Oklahomans living in many parts of the State possess inferior recreational opportunities, and those facilities currently planned are not likely to remedy the situation. The approach presented can be used to improve the evaluation of regional recreation facilities, to plan facility development strategies and to assess proposed facilities both in Oklahoma and throughout the United States. Appendices describe the methodology employed in the study, the relationship of demand and opportunities, the relationship of planning region boundaries to recreational behavior, and usage of existing facilities in Oklahoma.
W75-02890

OPTIMAL ALLOCATION OF WATER QUALITY CONTROLS IN URBANIZING RIVER BASINS,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5G.
W75-02908

ON LINKING LOCAL RURAL INCOME REDISTRIBUTION TO RECLAMATION INVESTMENTS,
Utah State Univ., Logan.
R. Willis, and A. LeBaron.
In: Proceedings WAEA Forty-Fifth Annual Meeting July 23-25, 1972 Logan, Utah, p 322-330 (1972). 4 fig, 1 tab, 17 ref. OWRT B-049-UTAH(1). 14-31-0001-3342.

Descriptors: *Income distribution, Supplemental irrigation, *Irrigation water, Gross income, Agriculture, Economics, *Utah, *Investment, Reclamation, Social aspects, Welfare(Economics).
Identifiers: Income redistribution, Emery County(Utah).

Social well being is an accepted subset of water investment feasibility criteria. An attempt is made to isolate income redistribution impacts conferred by Bureau of Reclamation projects. These preliminary results are from a single project. The initial site was utilized to yield both pre and post project estimates of farm income and wealth. Two techniques were employed to display the results. Lorenz curves were developed to show changes in distribution of net income, income per acre, income per irrigated acre. In addition, listings of individual farmer income and wealth measures are included to show movements or changes in ranking from pre to post project times. Preliminary results tend to confirm the hypothesis that large farmers (in terms of acreage) tend to benefit more than small farmers; however, measured on a per irrigated acre basis, small farmers benefit relative to larger farmers. Over fifty percent of the farm families studied shifted into higher or lower income categories following project development. Further research will be required to establish whether the new water really had as much impact as surface indications suggest.
W75-02914

WATER LAW AND PRIVATE DECISION-MAKING: A CRITIQUE,
Indiana Univ., Bloomington.
For primary bibliographic entry see Field 6E.
W75-02938

A PRELIMINARY INPUT-OUTPUT WATER PLANNING MODEL FOR HAWAII,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 6A.
W75-02979

ANALYSIS OF THE IMPACT OF LEGAL CONSTRAINTS ON GROUNDWATER RESOURCE DEVELOPMENT IN IDAHO,
Idaho Bureau of Mines and Geology, Moscow.
For primary bibliographic entry see Field 4B.
W75-02981

RIVERINE RECREATIONAL DEVELOPMENT-MATHEMATICAL MODELING,
Carnegie-Mellon Univ., Pittsburgh. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-02985

BIOLOGICAL HYDROLOGIC SYSTEMS,
Office of Water Resources Research, Washington, D.C.
For primary bibliographic entry see Field 4D.
W75-03024

PROBLEMS IN DECISION-MAKING IN HYDROLOGY,
Vermont Dept. of Water Resources, Montpelier. Agency of Environmental Conservation.
M. L. Johnson.
In: Biological Effects in the Hydrological Cycle, Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana. p 8-17.

Descriptors: *Hydrology, *Decision making, Management, Attitudes, Motivation, Psychological aspects, Social aspects, Environment, Behavior, Competition.
Identifiers: Stimulation, *Biological effects, Environmental stress.

Improved decision-making is absolutely mandatory and must be far more than a convenience or interesting exercise. It must be based upon a knowledge of the biology of man and the dynamics of the community to which he belongs. Decision makers must recognize that man is more adaptive than his environment and that each decision must move us towards our long range goal. The process must be guided so that the improvements are real and not merely novel displacements. (See also W75-03023) (Humphreys-ISWS)
W75-03025

DYNAMICS OF HUMAN POPULATIONS,
Purdue Univ., Lafayette, Ind. Natural Resources and Environmental Science Program.
R. L. Giese.
In: Biological Effects in the Hydrological Cycle, Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana. p 31-50. 10 fig, 6 tab, 17 ref.

Descriptors: *Human population, Population, Density, Distribution patterns, Growth rates, Migration, Morality, Spatial distribution, United States, Foreign countries.
Identifiers: *Demographic processes, Population composition.

The current global excitement about human populations stems mainly from the trend of population growth and the implications an exponentially expanding population has in terms of resources and pollution. There is a need for an elementary understanding of the processes and attributes which determine population levels to help replace some of the mysticism by an objective and analytical approach to the problems confronting man. The dynamics of human populations were discussed. Emphasis was placed on the Unites States although other nations were freely used to exemplify various concepts. (See also W75-03023) (Humphreys-ISWS)
W75-03027

THE RECREATIONAL USES OF WATER,
Indiana Univ., Bloomington. Dept. of Recreation and Park Administration.
R. E. Carlson.
In: Biological Effects In The Hydrological Cycle, Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana. p 265-274, 9 ref.

Descriptors: *Recreation, *Water sports, Reasonable use, Recreation demand, Social aspects, Water policy, Social needs, Decision making, *Water utilization, *Research priorities.

With the growing demand for freshwater, the increasing problems of pollution, the urbanization of our population, the concern for aesthetic valus, and the pressures on wildlife resulting from diminished wetlands and increased recreation demand, there are inevitably conflicts over priorities for the use of water. Resolving these conflicts is a matter of public policy as well as technological decision making. Decisions regarding water use must be made in terms of public benefits rather than particular demands. Some problems related to water based recreation and directions which society is headed toward were discussed in the broad areas of: (1) the nature and extent of water-based recreation, (2) the relationship of recreation and water quality, (3) policy issues in water recreation, and (4) needed research. (See also W75-03023) (Humphreys-ISWS)
W75-03034

ENVIRONMENTAL POLICY AND POLITICAL DECISIONS: THE RECONCILIATION OF FACTS, VALUES, AND INTERESTS,
Colorado State Univ., Fort Collins. Dept. of Political Science.

For primary bibliographic entry see Field 6E.
W75-03039

CRITIQUE OF ROLE OF TIME ALLOCATION IN RIVER BASIN MODEL,
North Carolina Univ., Chapel Hill. Center for Urban and Regional Studies.
P. G. Hammer, Jr.
Copy available from GPO Sup Doc as EP1.23:600/5-73-007, $3.40; microfiche from NTIS, Springfield, Va. 22161 as PB-238 489; $2.25. Environmental Protection Agency, Socioeconomic Studies Series, EPA-600/5-73-007, September 1973, 343 p. EPA Program Element 1HA096. R-801521.

Descriptors: *Model studies, *River basins, Time series analysis, *Attitudes, Human populations, Optimization, Simulation analysis, *Social impact, Environment, Social participation.
Identifiers: *Time use allocation, *Consumer behavior, *Labor-leisure models.

This critique presents a review of the theory of time use in consumer behavior and applies this review to an evaluation of time and location assignment procedures for population units in the Social Sector of the River Basin Model. Time allocations in this model serve to describe population unit work, travel and leisure behavior and to link them to the operations of other sectors through spatial movements, flow of goods and services, and participation in institutional activities. The objective of the simulations contemplated by the model is the identification of the impacts of man's activities on his environment. (EPA)
W75-03052

APPLICATION OF REMOTE SENSING TO STATE AND REGIONAL PROBLEMS,
Mississippi State Univ., State College. Inst. for Environmental Studies.
C. W. Bouchillon, W. F. Miller, H. Landphair, and V. L. Zitta.
Available from the National Technical Information Service, Springfield, Va 22161, as N74-22973, $3.25 in paper copy, $2.25 i. microfiche. Semi-Annual Progress Report No 1, November 1, 1973-April 30, 1974. 20 p, 1 append. NASA Grant NGL-25-001-054.

Descriptors: *Remote sensing, *Mississippi, Programs, *Parks, Environmental, *Land classification, Education, *Water pollution sources, Channels, Coniferous forests, Regional analysis.

The activities of the Remote Sensing Applications Program are assisting the state of Mississippi in recognizing and solving its environmental, resource, and socio-economic problems through inventory, analysis, and monitoring by appropriate remote sensing systems. Objectives and progress were reported for: (1) Copiah County Bark Beetle Project, (2) Natchez State Park Locational Study, (3) Waste Source Location and Stream Channel Geometry, and (4) a Remote Sensing Workshop. Plans for the future directions of the program were listed. (Humphreys-ISWS)
W75-03107

COASTAL ZONE BIBLIOGRAPHY (ANNOTATED).
Delaware State Planning Office, Dover.
For primary bibliographic entry see Field 2L.
W75-03109

ECONOMIC AND ECOLOGICAL APPROACHES TO THE OPTIMAL LEVEL OF POLLUTION,
London Univ. (England). Dept. of Economics.
For primary bibliographic entry see Field 5G.
W75-03121

A STATISTICAL ESTIMATE OF THE DEMAND FOR AND VALUE OF OUTDOOR RECREATION IN THE SAWTOOTH VALLEY AND MOUNTAIN AREA, IDAHO,
Idaho Univ., Moscow. Water Resources Research Inst.
C. M. Gilmour, Jr.
MSc Thesis, May 1973. 111 p, 21 tab, 6 fig, 35 ref. FS-44-297.

Descriptors: *Recreation, *Economic impact, *Idaho, *Recreation demand, Regional development, Value, Regression analysis, Least squares method, Carrying capacity.
Identifiers: *Sawtooth Valley(Ida).

In 1971, a modified interview survey of 522 recreationalists was conducted in Idaho's Sawtooth Valley and Mountain Area to assess characteristics of recreationalists and recreational activities, and to statistically estimate the demand for and net economic value of recreation within the area. Located approximately 130 miles northeast of Boise, the study area encompassed three lakes and portions of Sawtooth, Boise and Challis National Forest and the Salmon River. Results revealed that user groups were primarily from urban locations in southern Idaho and states to the south of Idaho. Recreational groups tended to have high incomes--averaging $14,400 per year--and were primarily family groups. Principal recreational activities included camping, sightseeing, fishing, hiking, photography, and swimming. Trip expenditures averaged $89.93 for Idaho residents and $396.76 for out of state visitors. Total recreationalist expenditures were estimated to be $1,174,000 for the period. The net economic value of recreation imputed from the consumer surplus under the demand curve derived from the socio-economic data collected was equal to $2,627,813, an average value of $373 per visitor day. (Schroeder-Wisconsin)
W75-03130

RECREATIONAL AND SOCIOLOGICAL CHARACTERISTICS OF HUNTERS AND AN ESTIMATE OF THE DEMAND FOR HUNTING IN THE SAWTOOTH AREA OF IDAHO,
Idaho Univ., Moscow. Water Resources Research Inst.
E. L. Michalson.
Scenic River Study Report No 7, August 1973. 85 p, 33 tab, 4 ref. FS. 44-297.

Descriptors: *Recreation, *Hunting, *Idaho, Economic impact, Value engineering, Value, Regression analysis, *Recreation demand.
Identifiers: *Sawtooth Valley(Ida), Hunting patterns, Carrying capacity.

A three part study of the economic impact of hunting activities within Idaho's Sawtooth Valley and adjacent mountainous areas was conducted in 1972. 112 usable mail questionaires were return providing information from about 10% of the areas' 1971 hunting population. 12 per cent of the respondents resided out-of-state. The survey indicated that the average hunter was 30-40 years of age, a male, had attended college, and had an annual income of $10,000 to $15,000. Data from the study were used to estimate demand equations for hunting. The statistical approach utilized two multiple regression models, a linear form and a log transformation, and estimated the number of visitor days as a function of miles traveled, cost per visitor day, education level, and annual income. The linear model was principally relied upon because of its ease in variable manipulation. The equation developed estimated that an average hunting trip consisted of 6.8 visitor days at a $9.78 cost per visitor. The resource value was estimated at $186,419. Total hunter expenditures in Sawtooth were estimated at $74,690. Projections of the economic impact of alternative hunting patterns are also provided utilizing the previously developed demand equations. (Schroeder-Wisconsin)
W75-03131

A SURVEY OF LANDOWNERS' ATTITUDES AND OPINIONS IN THE SAWTOOTH VALLEY,
Idaho Univ., Moscow. Water Resources Research Inst.
E. L. Michalson.
Scenic River Study Report No 4, March 1973. 49 p, 15 tab, 2 fig. FS-44-297.

Descriptors: Land tenure, Land management, *Land use, Land development, Land classification, Parks, Social aspects, Decision making, *Attitudes, Psychological aspects, *Idaho, Social values, Recreation.
Identifiers: *Sawtooth Valley(Ida), Carrying capacity studies, National Recreation Area.

A mail questionnaire was sent to 850 landowners within Idaho's Sawtooth Valley to obtain attitudes towards the potential management of the area as a National Recreational Area or a National Park. The survey was conducted prior to the sites' actual designation as a NRA. A total of 394 respondents completed all or part of the survey. The average age of respondent landowners was 51. Most were professional people, farmers, proprietors, and craftsmen having some college education. Few depended on their Sawtooth property for a main portion of their annual income. The average ownership period was 8.9 years. Land use was dominated by recreational uses and livestock grazing with most perceiving increased recreational use in the future; land speculation and commercial sites shared third rank as land uses for property which has been sold. Landowners were generally aware of the proposed NRA designation, with many preferring the existing status quo. Most indicated a desire for more campground and recreational facilities on public land; but also sought greater regulation and limited development of snowmobile and motorbike trails. Small landowners were more concerned with recreational property values while large landowners reflected on agricultural attitude. (Schroeder-Wisconsin)
W75-03132

REPORT OF VEGETATION STUDY,
Idaho Univ., Moscow. Water Resources Research Inst.
J. R. Herbst.
Scenic Rivers Study Report No 1, November 1972. 43 p, 15 ref, 33 illustrations. FS-44-297.

Descriptors: *Recreation, *Vegetation, *Idaho, Camping, Camp sites, Recreation facilities, Vegetation effects, Vegetation establishment, Land management, Forest management, Environmental effects, Carrying capacity.
Identifiers: *Sawtooth Valley(Ida).

The impact of recreational activities on Sawtooth Valley vegetation is evaluated. The Idaho Valley is presently under consideration as a National Recreational Area. Field work was undertaken from July 15 to August 30, 1972. The Valley was divided into three management areas: valley floor, middle ground, and high country. Study sites were chosen in campgrounds within each managerial area or in the case of the high country, within a campsite. Sampled sites were representative of various vegetative types and of types and degrees of recreational use in the Valley. Quantitative as well as visual descriptions of vegetative types were compiled for each site, and the relative carrying capacity of various vegetative types estimated. Photo points were made to measure the condition of campsites and to provide a visual record of the impact of recreational use over time. Results indicate that plant communities in the middle and high areas are dominated by spruce-fir/Western Ledum and Subalpine Fir/Grouse-Whortleberry, Pine/Idaho Fescue. Douglas-Fir/Pinegrass, Subalpine Fir-Englemann spruce/Bluejoint Reed grasses were found throughout valley sites. (Schroeder-Wisconsin)
W75-03133

COSTS AND BENEFITS OF THE ABATEMENT OF POLLUTION OF BISCAYNE BAY, MIAMI, FLORIDA,
Miami Univ., Coral Gables, Fla.
For primary bibliographic entry see Field 5G.
W75-03140

SCENIC RIVER STUDY OF THE LOWER ST. CROIX RIVERS.
Bureau of Outdoor Recreation, Washington, D.C.
Report, February 1973. 106 p, 4 fig, 5 tab, 4 maps, 34 photos.

Descriptors: *Water resources, *Minnesota, Wisconsin, Planning, *Wild rivers, Running waters, Wild River Act, Conservation.
Identifiers: *St. Croix River(Minn), *Scenic rivers.

Pursuant to the 1968 Wild and Scenic River Act, representatives of several state and federal agencies and organizations undertook a survey of a portion of the St. Croix River to identify and assess the scenic, recreational, geological, fish and wildlife, historic, and cultural values which should be preserved in free-flowing conditions for the benefit and enjoyment of present and future generations. The extensive study of geologic, economic, environmental, and institutional conditions of the area concludes that the area represents a highly scenic course, possessing water of high quality suitable for the many recreational efforts of nearby Minneapolis-St. Paul residents, and areas of outstanding geological interests. The area also possesses a colorful history which should be preserved. The river's intrinsic values are presently endangered by a number of factors including rapid shoreline development and declining water quality. To preserve the area, it is suggested that it be encompassed in the Scenic River System; that the two State and the National Park Services prepare comprehensive plans for the management of the area; appropriate zoning, land use plans and improved water and air quality standards be implemented; and assistance be provided to private industry (e.g. railroad and utilities) to minimize area disruption. (Schroeder-Wisconsin)
W75-03141

PROPOSED NATURAL AREAS: PIVOT ROCK SPRING REPORT NO. 34,
Arizona Academy of Science, Tempe.
E. L. Smith, and G. L. Bender.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-225 248, $3.25 in paper copy, $2.25 in microfiche. Report OEPAD-EP-73-34, June 1973. 7 p, 1 fig. HUD CPA-AZ-09-16-1008.

Descriptors: *Preservation, *Planning, *Arizona, Natural resources, Conservation, *Land management, Land classification, National Forests.
Identifiers: *Pivot Rock Spring(Ariz), Coconino National Forest(Ariz).

Pivot Rock Spring, located in the Coconino National Forest, is north of the Gila County line in Coconino County, Arizona. The site is recommended as an Educational and Recreational Natural Area. Pivot Rock Spring emerges from Quarternary Basalt in an offshoot of Pivot Rock Canyon, a fairly narrow but not steep canyon. Ridges bordering the canyon support a ponderosa pine stand which dissolves into a stand of Gambel oak. Stands of quaking aspen can be found in the canyon bottom. Fauna in the Pivot Rock Spring area consists of pine-oak woodland species, including the house wrens, solitary vireo, common raven, pack rat, striped skunk, and western fence lizards. Disturbances to the region have been minimal, centering primarily on littering, defacing of trees, and several boards across the spring itself. Benefits arising from the proposed natural area status include limiting future degradation of the area and provision of an educational area in which students and visitors could learn something about the floral and faunal relationships, hydrology, and geology of the area. (Schroeder-Wisconsin)
W75-03142

1971 COQUILLE RIVER ESTUARY RESOURCE USE STUDY,
Oregon Fish Commission, Salem. Div. of Management and Research.
For primary bibliographic entry see Field 6C.
W75-03143

1971 NESTUCCA RIVER ESTUARY RESOURCE USE STUDY,
Oregon Fish Commission, Salem. Div. of Management and Research.
For primary bibliographic entry see Field 6C.
W75-03144

WATER RESOURCE INVESTMENT AND ECONOMIC DEVELOPMENT: BALANCED VERSUS UNBALANCED INVESTMENT STRATEGIES,
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6C.
W75-03145

CIVIL ENGINEERING INVESTIGATIONS AND ECONOMIC STUDIES FOR THE PIEMAN RIVER POWER DEVELOPMENT,
Hydro-Electric Commission, Tasmania (Australia). Civil Engineering Div.
For primary bibliographic entry see Field 8C.
W75-03146

THE POLITICAL ECONOMY OF REGIONAL WATER INSTITUTIONS,
Arizona Univ., Tucson.
For primary bibliographic entry see Field 6E.
W75-03147

DETERMINANTS OF DEMAND FOR FISH AND THEIR EFFECTS UPON RESOURCES,
Food and Agriculture Organization of the United Nations, Rome (Italy). Fishery Economics and Development Branch.
For primary bibliographic entry see Field 6C.
W75-03148

RAILROADS, IRRIGATION, AND ECONOMIC GROWTH: THE SAN JOAQUIN VALLEY OF CALIFORNIA,
California State Univ., Fresno.
J. A. Shaw.
Explorations in Economic History, Vol 10, No 2, p 211-221, 1973. 1 fig, 4 tab, 16 ref.

Descriptors: *Irrigation, *Navigation, *California, Irrigation effects, Navigable rivers, Railroads, Transportation, Cost comparisons, Economic feasibility, Economics.
Identifiers: *San Joaquin River(Calif).

Cost estimates by Fogel in 'Railroads and American Economic Growth: Essays in Econometric History' (1964) dealing with a network of canals and natural waterways replacing the railroad system in California's San Joaquin Valley are disputed. Central to the dispute is Fogel's inclusion of the San Joaquin River as part of his water system. Examination of the river indicates that canalization of the river and well developed commercial agricultural interests are generally incompatible for the region. Specifically, Fogel is shown to have ignored the impact of irrigation on the area's development, overstated the areas of feasible commercial agriculture, disregarded the impact of irrigation on the navigability of the unimproved river, and implicitly assumed that the entire output of the valley could be shipped out on the river during the 76 days of assumed navigation. Adjustments to account for these factors indicate that the actual decline in income resulting from the conversion to water based transportation is much greater for the valley than that estimated. This clouds Fogel's estimates of the feasibility of such conversion throughout the United States. (Schroeder-Wisconsin)
W75-03150

INDIRECT ECONOMIC EFFECT FROM GULF INTRACOASTAL WATERWAY COMMERCE IN TEXAS,
Texas A and M Univ., College Station. Industrial Economics Research Div.
C. Phillips.
Sea Grant Program Report TAMU-SG-74-218, July 1974. 115 p, 5 fig, 25 tab, 31 ref, 5 appendix. NOAA 04-3-158-18.

Descriptors: *Inland waterways, Economics, *Texas, Channels, Coasts, Industries, Intertidal areas, Employment, Income, Data collections, Gulf of Mexico, Estuaries, Evaluation, *Economic impact.
Identifiers: *Coastal zone, *Intracoastal waterways, Gulf Intracoastal Waterway.

This study evaluates the indirect economic effect of the Texas Gulf Intracoastal Waterway and its tributaries on Texas. Determination of indirect economic effects was based on an initial calculation of the Gulf Intracoastal Waterway's contribution to the five coastal SMSAs. The aggregate economic stimulus of both direct and indirect contributions from waterway activities consisting of tax, education, and manufacturing revenues, income, waterway maintenance and industrial construction expenditures came to $3.9 billion, equivalent to 4.5 percent of the Texas State Product. This figure applies only to the waterway and does not describe the total impact of the entire coastal zone. Other benefits to both consumers and industries pertain to reduced transportation costs offered by marine vessels. Development of the waterway to accommodate different transportation modes and raising traffic capacity are important considerations in decision making by leaders in government and industry. (NOAA)
W75-03186

ENVIRONMENTAL VALUES IN DECISION MAKING: PORT JEFFERSON AS A CASE STUDY,
Grumman Ecosystems Corp., Bethpage, N.Y.
For primary bibliographic entry see Field 6G.
W75-03225

INTEGRATING WATER QUALITY AND WATER RESOURCES PLANNING,
Office of Land Use and Water Planning, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-03227

THE EFFECTS OF WATER FRONTAGE ON RECREATIONAL PROPERTY VALUES,
Florida Univ., Gainesville. Water Resources Research Center.
J. R. Conner, K. C. Gibbs, and J. E. Reynolds.
Journal of Leisure Research, Vol 5, p 26-38, Spring, 1973. 2 tab, 10 ref. OWRT B-007-FLA(4), 14-31-0001-3267.

Descriptors: *Property values, Economics, Evaluation, *Recreation, *Florida, Estimating.
Identifiers: *Kissimmee River basin(Fla), *Water frontage, Waterfront property.

Two methods of estimating the value of the presence of water frontage to a typical residential property are presented. Data from the Kissimmee River Basin, Florida, are used in the analyses. The first method uses multiple regression to analyze

the effect of several independent variables, including lake frontage on vacant residential lot sales. The second attempts to estimate the value attributed to the presence of water frontage from owners' estimates of the value of their property with and without water frontage. The primary purpose for presenting both methods is to obtain estimates of the value of water frontage to vacant residential lots and lots with structures. Lakefront and non-lakefront vacant residential lot sale prices were estimated as a function of the year of the sale, the size of the lot, the presence or absence of lake and canal frontage, the distance from the lot to the nearest paved road, the number of utilities available in the subdivision, and the percent of wood homes in the subdivision. From the lot sales analysis, it was estimated that the presence of lake frontage would contribute about 65 percent to the total value of a typical vacant residential lot. In a survey of lakefront residents of the Kissimmee River Basin, the respondents were asked to estimate the current value of their property and the value of the property if it did not have lake frontage. The average of the responses indicated that the presence of lake frontage contributed about 48 percent to the total value of their property. (Morgan-Florida)
W75-03273

DAM: A COMPUTER IMPLEMENTED WATER RESOURCE TEACHING GAME,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Fisheries and Wildlife Sciences.
F. B. Titlow, and R. T. Lackey.
Transactions of the American Fisheries Society, Vol 103, No 3, July 1974, p 601-609. 1 fig, 1 tab, 8 ref.

Descriptors: *Computer models, Model studies, *Mulitple-purpose projects, *Resource allocation, Water resources development, *Management, Education, Training, Manpower, *Administrative decisions.
Identifiers: Teaching.

Development and use of DAM, a computer implemented learning exercise designed to illustrate management of a large multiple-use reservoir system, is described. Five management roles are available to students using DAM: (1) a regional planning commissioner; (2) a fisheries manager; (3) a power company executive; (4) a recreation specialist; (5) a city mayor. We found that allowing students a switch roles emphasized inherent management conflicts and increased total system appreciation. There is no 'best' management scheme for DAM. In practice, students manage until they can agree on and defend a particular strategy. The specific goal of DAM is to provide students with an understanding of the principles and problems of managing a multiple-use resource. Response from students indicates this goal was achieved. DAM is currently played by students' keypunching decisions on computer cards and submitting these to the computer center. An improvement would be to place DAM on a permanent file for access by remote typewriter terminal.
W75-03297

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

COSTS AND RETURNS FROM CROPS AND LIVESTOCK IN THE UPLAND DESERT VALLEYS OF NEVADA,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 4A.
W75-02898

PHYSICAL AND ECONOMICAL ASPECTS OF CONJUNCTIVE USE OF IRRIGATION WATER IN SMITH VALLEY, LYON COUNTY, NEVADA,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 4B.
W75-02899

LAND DISPOSAL OF WASTEWATER WITH SPRAY IRRIGATION BY SMALL MICHIGAN MUNICIPALITIES - AGRICULTURAL, INSTITUTIONAL, AND FINANCIAL CHARACTERISTICS,
Michigan State Univ., East Lansing. Dept. of Agricultural Economics; and Michigan State Univ., East Lansing. Dept. of Resources Development.
For primary bibliographic entry see Field 5D.
W75-02982

1971 NEHALEM RIVER ESTUARY RESOURCE USE STUDY,
Oregon Fish Commission, Salem. Div. of Management and Research.
T. Gaumer, D. Demory, and L. Osis.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-10347, $3.75 in paper copy, $2.25 in microfiche. November 1973. 27 p, 16 tab, 6 fig. DACW 57-72-C-0138, N208-0073-72(N), and N04-3-208-55.

Descriptors: *Surveys, *Recreation, *Estuarine fisheries, *Oregon, Fisheries, Fish management, Angling, Sport fishing.
Identifiers: *Nehalem River Estuary(Ore).

Over an eight month period in 1971, 2427 boat, shore, and tideflat resource users were interviewed to obtain estimates of catch, effort values, and angler origin in the Nehalem River Estuary. Data collected were combined with earlier studies to prepare maps illustrating principal boat fishing areas, clam beds, eel grass beds, fish feed areas and migration routes. Results indicate that 20,300 user trips (17,000 boat, 2,900 shore, and 1,100 tideflat) involving 63,700 hours of effort (57,600, 7,600, and 500 respectively) occurred during the period. Anglers of the three fisheries harvested 30,700 marine animals (18,000 crabs, 7,400 fish, 4,400 clams, and 900 shrimp). Dungeness crab comprised 84% of the boat anglers' total catch while fish represented the primary catch (84%) of shore anglers. Pacific staghorn sculpin and shines perch were the primary species taken. Soft shell clams and ghost shrimp were the only species taken by tideflat users. Commercial landings of shellfish in the estuary during 1970 added an additional catch of 589 pounds of littleneck clams valued at $206. 85% of anglers interviewed were Oregon residents living outside of Tillomook County. 7% were out-of-state residents. (Schroeder-Wisconsin)
W75-03122

MAINE'S FRESH AND SALT WATER PLEASURE BOAT SERVICE INDUSTRY BOATING BUSINESS WORKSHOP, HELD AT HOLIDAY INN, AUGUSTA, MAINE, 26 MARCH 1973.
Maine Univ., Orono. Cooperative Extension Service.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-10583, $4.25 in paper copy, $2.25 in microfiche. Maine Sea Grant Bulletin 1, 59 p, 1 tab.

Descriptors: *Economics, *Boats, *Maine, Recreation, Financing, Budgeting, Marinas, Industries, Boating regulations, Management, Regional economics, Insurance.
Identifiers: Accounting, Boating industry, Boat service industry, Pleasure boats, Occupational Health and Safety Act.

Highlights of a workshop for members of Maine's fresh and salt water pleasure boat service industry are presented. Topics covered include industry accounting practices, financing, company insurance, marine insurance, Occupational Safety and Health Act (OSHA) provisions, store management, service shop management, store sales and effective advertising, and Maine's excise tax and potential new boating laws. The recent reorganization and continuing responsibilities of Maine's Department of Environmental Protection are also discussed. A copy of the by-laws of the Maine Boat Builders and Repairers is also given. (Schroeder-Wisconsin)
W75-03123

SIMULATION OF MINIMUM ENVIRONMENTAL AND ECONOMIC DISPATCH OF POWER,
National Center for Energy Management and Power, Philadelphia, Pa.
For primary bibliographic entry see Field 5G.
W75-03127

COSTS OF HAULING AND LAND SPREADING BY DOMESTIC SEWAGE TREATMENT AND PLANT SLUDGE,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5D.
W75-03129

POLLUTION CONTROL COSTS AND RESEARCH PRIORITIES IN THE ANIMAL SLAUGHTERING AND PROCESSING INDUSTRIES.
National Industrial Pollution Control Council, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-03137

1971 COQUILLE RIVER ESTUARY RESOURCE USE STUDY,
Oregon Fish Commission, Salem. Div. of Management and Research.
T. Gaumer, D. Demory, and L. sis.
Available from the National Technical Information Service, Springfield, Va 22161, as COM-74-10343, $3.75 in paper copy, $2.25 in microfiche. Report, November 1973. 27 p, 6 fig, 16 tab. NO4-3-208-55, NOAA N208-0073-72(N), DACW 57-72-C-0138.

Descriptors: *Fishing, *Recreation, *Oregon, Fish management, Estuaries, Clams, Crabs, Smelts.
Identifiers: *Resource use, *Coquille River Estuary(Ore), Shad.

In March-October, 1971 a comprehensive study was conducted of marine food fish, shellfish, and miscellaneous invertebrates, excluding the anadromous sports fisheries, in the Coquille River estuary. The esturay, located 290 miles south of the Columbia River, consists of a 771 acre bay with 301 acres of tideland. To construct a series of marine resource maps, 1,809 boat, shore, tideflat, and scuba resource users were interviewed. The maps illustrate principal boat fishing areas, clambeds, eel grass beds, food production areas, fish feeding areas, and migration routes. Recreation data compiled indicates that 13,700 resource user trips (1,800 boat, 11,700 shore, and 200 tideflat) were made in the estuary to harvest 67,600 animals (62,000 fish, 3,000 crabs, and 2,600 clams). Dungeness crabs represented 91% of the boat anglers' total catch. Surf smelt comprised the most common species caught by shore anglers. Softshell clams made up 99% of the total tideflat users take. Commercial fisheries in the estuary also harvested 14,022 pounds valued at $2,351, with shad the primary species harvested. Coos County residents made up 53% of the resource users. (Schroeder-Wisconsin)
W75-03143

1971 NESTUCCA RIVER ESTUARY RESOURCE USE STUDY,
Oregon Fish Commission, Salem. Div. of Management and Research.

T. Gaumer, D. Demory, and L. Osis.
Available from the National Technical Information Service, Springfield, Va 22161, as COM-74-10340, $3.25 in paper copy, $2.25 in microfiche. Report, November 1973. 24 p, 6 fig, 16 tab. NO4-3-208-55, NOAA N208-0073-72(N), DACW 57-72-C-0138.

Descriptors: *Fishing, *Recreation, Oregon, Fish management, Estuaries, Crabs, Trout, Clams, Sculpins, Shrimp, Perches.
Identifiers: *Resource use, *Nestucca River Estuary(Ore).

In March-October, 1971, a comprehensive study was conducted of the marine food fish, shellfish, and miscellaneous invertebrates excluding the anadromous fisheries in the Nestucca River Estuary. The estuary, located 101 miles south of the Columbia River, possesses a 1,000 acre bay with 578 acres of tidelands. In the study, 1,238 boat, shore, and tideflat users were interviewed to generate several maps illustrating principal boat fishing areas, clambeds, eel grass beds, food production areas, fish feeding areas, and fish migration routes. An estimated 3,900 boat angler trips representing 15,200 hours were spend in the estuary. Dungeness crabs and cutthroat trout were the primary species taken by the boat fishermen. Shore anglers spent 4,700 angler trips, or 11,900 hours, catching primarily Pacific staghorn sculpin and shiner perch. Tideflat users harvested clams and shrimp from the estuary in 1500 user trips. The majority (84%) of the anglers interviewed were Oregon residents residing outside of Tillamook County, 11% were Tillamook residents, and the remainder were out-of-state residents. (Schroeder-Wisconsin)
W75-03144

WATER RESOURCE INVESTMENT AND ECONOMIC DEVELOPMENT: BALANCED VERSUS UNBALANCED INVESTMENT STRATEGIES,
Maryland Univ., College Park. Dept. of Civil Engineering.
R. H. McCuen.
Water Resources Bulletin, Vol 10, No 3, p 522-530, June 1974. 11 ref.

Descriptors: *Water resource development, *Investment, Regional development, Economics.
Identifiers: *Balanced investment, Economic growth, Investment strategy.

Whether water resource investments are useful in fostering economic growth is still disputed among economists. This disparity of opinion is the result of numerous factors. Water development, for example is often aimed at reducing bottlenecks in alternative sectors, and economic sensitivity to increases in available water which may differ among sectors. The disparity may also be the result of the lack of balance in overall investment programs. Defining the investment strategy is complicated by the polarity associated with the term and the innumerable components incorporated in the investment scheme. The concept of balancing covers many aspects including the extent and composition of investment among sectors, relative investments among production equipment and human development, degree of public and primate control, and the relationship between exports and imports and savings and investments. Timing of investment is also important. Proponents for unbalanced growth argue that it requires a smaller capital outlay, limits government intervention, and effectively utilizes existing labor and managerial supply. Opponents maintain that such limited investment ties economic growth to a single sector making it susceptible to the impacts of changes in demand. It is important to recognize, however, that either investment strategy can be effective only when it eliminates bottlenecks. (Schroeder-Wisconsin)
W75-03145

CIVIL ENGINEERING INVESTIGATIONS AND ECONOMIC STUDIES FOR THE PIEMAN RIVER POWER DEVELOPMENT,
Hydro-Electric Commission, Tasmania (Australia). Civil Engineering Div.
For primary bibliographic entry see Field 8C.
W75-03146

DETERMINANTS OF DEMAND FOR FISH AND THEIR EFFECTS UPON RESOURCES,
Food and Agriculture Organization of the United Nations, Rome (Italy). Fishery Economics and Development Branch.
M. A. Robinson.
Journal Fisheries Research Board of Canada, Vol 30, No 12, Pt 2, p 2051-2058, 1973. 6 tab.

Descriptors: *Fish management, *Demand, Economics, Fish farming, Fish harvest, Human population, Elasticity of demand, Income.
Identifiers: *Fish consumption, Fish meal.

World fish consumption has increased nearly double the growth rate of the world's population since WW II. To just maintain per capita world fish consumption at its present level will require an increased fish supply of 8 million tons by 1980, and 27 million by 2000. Several factors affecting world fish demand are assessed. Two of the major factors significantly affecting future consumption demands are population and income growth. The relative impact of income changes appears to vary throughout the world. Results of several studies indicate that the income elasticity of demand was generally inelastic, varying from 1.0 in Indonesia to .28 in the U.S. In absolute terms, however, the differences in demand are impressive, with developed countries--classified by income levels--having an average per capita consumption three times that of developing countries. In developing countries, fish account for 20% of the animal intake and nearly 1/3 for the Asian countries. In developed countries, a majority of the fish demand is converted to fish meal and oil rather than consumed directly. To meet increased consumption, better fishery management techniques must be utilized to prevent overcapacity in the world's fishing fleet and overfishing threatening the fisheries' productive capacity. (Schroeder-Wisconsin)
W75-03148

STATUS OF CONSTRUCTION FOR ENVIRONMENTAL PROTECTION,
Bureau of Domestic Commerce, Washington, D.C. Construction, Water Resources and Engineering Services Div.
For primary bibliographic entry see Field 5D.
W75-03226

RAW MATERIALS TRANSPORTATION COSTS AND THEIR INFLUENCE ON THE USE OF WASTEPAPER AND SCRAP IRON AND STEEL, VOLUME II, APPENDICES,
Resource Planning Inst., Cambridge, Mass.
For primary bibliographic entry see Field 5G.
W75-03299

6D. Water Demand

WATER FOR TOMORROW'S CITIES: POLICY VARIABLES IN RESIDENTIAL WATER RESOURCES MANAGEMENT,
Toronto Univ. (Ontario). Dept. of Geography.
For primary bibliographic entry see Field 3D.
W75-02753

MANAGEMENT OF THE WATER CYCLE IN ENGLAND AND WALES,
Watson (J. D. and D. M.), London (England).
For primary bibliographic entry see Field 5E.
W75-02764

WATER RESOURCES DEVELOPMENT AND FLOOD CONTROL ALONG THE DANUBE RIVER,
Technical Univ. of Budapest (Hungary). Inst. of Water Management and Hydraulic Construction.
For primary bibliographic entry see Field 4A.
W75-02777

WATER FOR INDUSTRIAL DEVELOPMENT IN BENTON, LAFAYETTE, MARSHALL, PONTOTOC, TIPPAH, AND UNION COUNTIES, MISSISSIPPI,
Geological Survey, Jackson, Miss.
For primary bibliographic entry see Field 2E.
W75-02814

THE RECREATIONAL USES OF WATER,
Indiana Univ., Bloomington. Dept. of Recreation and Park Administration.
For primary bibliographic entry see Field 6B.
W75-03034

A STATISTICAL ESTIMATE OF THE DEMAND FOR AND VALUE OF OUTDOOR RECREATION IN THE SAWTOOTH VALLEY AND MOUNTAIN AREA, IDAHO,
Idaho Univ., Moscow. Water Resources Research Inst.
For primary bibliographic entry see Field 6B.
W75-03130

RECREATIONAL AND SOCIOLOGICAL CHARACTERISTICS OF HUNTERS AND AN ESTIMATE OF THE DEMAND FOR HUNTING IN THE SAWTOOTH AREA OF IDAHO,
Idaho Univ., Moscow. Water Resources Research Inst.
For primary bibliographic entry see Field 6B.
W75-03131

6E. Water Law and Institutions

MANAGEMENT OF THE WATER CYCLE IN ENGLAND AND WALES,
Watson (J. D. and D. M.), London (England).
P. C. G. Isaac.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 154-165. 2 fig.

Descriptors: *Management, *Water resources, *Legislation, *Administrative agencies, Administration, Water resources development, Regulation, Institutions, Water law, Water policy, Foreign countries, *Hydrologic cycle, Regional analysis.
Identifiers: *Regional water authorities, United Kingdom(England-Wales).

Technical requirements of the water needs in England and Wales at the end of the century underlie the proposals made by the British Government in December 1971 for the reorganization of the management of the water cycle in England and Wales. The present organization and law were discussed for the management of the water cycle. The nine aspects of the water cycle included: water conservation, water supply, urban drainage and sewage disposal, disposal of industrial effluents, land drainage and flood control, prevention of pollution, recreation and amenity, fisheries, and canals and inland navigation. The proposed reorganization in a Water Bill, now before Parliament, dealing solely with administrative reorganization would establish 10 Regional Water Authorities (RWA). These 10 authorities would take over the following functions: water conservation, control of water pollution, land drainage and flood control, navigation, fisheries, and recreation and aminity from 29 River Authorities; water

supply from over 150 Local Authorities and Joint Water Boards; and sewerage and sewage disposal from some 1200 Local Authorities and Joint Sewerage Boards. (See also W75-02751) (Humphreys-ISWS)
W75-02764

PLANNING, MANAGEMENT AND FINANCING OF INTERSTATE RIVER VALLEY PROJECTS IN INDIA,
Madhya Pradesh (India). Irrigation Dept., Bhopal.
For primary bibliographic entry see Field 6B.
W75-02765

WATER RESOURCES RESEARCH POLICIES FOR THE GREAT LAKES,
Great Lakes Basin Commission, Ann Arbor, Michigan.
L. T. Crook.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 220-232.

Descriptors: *Water resources, *Great Lakes, *Research priorities, *Federal government, *Canada, *United States, Technology, Water resources development, Management, Planning, Research and development, Lakes.
Identifiers: Great Lakes Water Quality Agreement, International Field Year on the Great Lakes.

The hierarchy of water resources research policies governing the funding of research programs on the Great Lakes was presented. These policies stemmed from activities of the federal government for categorical research programs in several different fields. The influence of practitioners in water resources upon research efforts was investigated. The research programs of the several federal departments and their interrelationships were identified. A case was made for further integration of funding policies by the federal government as well as greater relativity with water resource problem solution resolving by means of directed research programs. The role of voluntary-membership research organizations on stimulation of research activities was acknowledged as well as that of citizens groups who challenged traditional theories and the policies of governmental agencies. The stated research policies and activities of Canadian Federal and Provincial Governments and informal relationships with United States' activities were presented. (See also W75-02751) (Bhowmik-ISWS)
W75-02770

LOWER COST METHODS OF WATER AND WASTE TREATMENT IN LESS DEVELOPED COUNTRIES,
Oklahoma Univ., Norman.
For primary bibliographic entry see Field 5D.
W75-02786

ACHIEVING WATER POLLUTION ABATEMENT UNDER THE 1972 WATER POLLUTION CONTROL ACT AMENDMENTS,
Office of Business Research and Analysis, Washington, D.C. Water Resources and Engineering Program.
For primary bibliographic entry see Field 5G.
W75-02860

MINNESOTA WATER AND RELATED LAND RESOURCES POLICIES WITH EMPHASIS ON THE 68TH LEGISLATIVE SESSION,
Minnesota Univ., St. Paul. Water Resources Research Center.
J. J. Waelti.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-238 310, $4.75 in paper copy, $2.25 in microfiche. WRRC Bulletin No 76. October 1974. 84 p, 6 ref. OWRT B-054-MINN(5). 14-31-0001-3601.

Descriptors: *Water policy, Resources, Water resources, *Planning, *Land resources, Legal aspects, Coordination, *Minnesota, State governments, *Legislation, *Water law.

Water Resources planners in Minnesota have followed three courses of action regarding water and related land resources framework planning. The first involves coordination of State activities, currently under the Department of Natural Resources, Bureau of Environmental Planning and Protection. The second has been directed at gathering background information on the water resource base and estimating resource needs to the year 2020. Third, water resource planners have inventoried State policy as it regards water resources. The actions of the 68th (1973-74) Legislative Session in resolving key water resource policy questions are reviewed. Described are existing policy (prior to the 68th session) as expressed in the law, recommendations expressed in the Governors Message on Environmental Quality to the 68th Session, recommendations of the Citizens Advisory Committee on Environmental Quality, and interim recommendations of the Legislature regarding water resources. The water resource related bills that became law during the 68th Session are enumerated and their key provisions are highlighted. These bills are reviewed for policy statements and directions. The key water resource policy questions are then reviewed and answered insofar as possible based on implicit and explicity policy statements of the Legislature.
W75-02886

ROLE OF THE SCIENTIST TECHNICIAN IN WATER POLICY DECISIONS AT THE COMMUNITY LEVEL: A STUDY IN PURPOSIVE COMMUNICATION,
Minnesota Univ., Minneapolis. Dept. of Rural Sociology.
For primary bibliographic entry see Field 6B.
W75-02888

LEGAL RESPONSIBILITIES FOR SEWAGE DISPOSAL IN AN URBAN COUNTY,
Ohio Dept. of Health, Columbus. Office of Planning.
For primary bibliographic entry see Field 5G.
W75-02936

THE FIRST TWO YEARS--A REVIEW OF EPA'S ENFORCEMENT PROGRAM,
Environmental Protection Agency, Washington, D.C.
W. D. Ruckelshaus, and J. R. Quarles, Jr.
Available from the National Technical Information Service, US Dept of Commerce, Springfield, Va 22161, as PB-227 158, $8.75 in paper copy, $2.25 in microfiche. February 1973. 280 p, 6 graphs, 5 tab.

Descriptors: *Pollution abatement, *Regulation, *Enforcement, Water pollution, Environmental sanitation, Judicial decisions, *Legislation, *Federal government, Water quality, environment effects, Water resources development, Natural resources, Water law, Environmental control, Water quality control, *Water quality standards, Water policy.
Identifiers: *Environmental policy, Administrative regulations.

The enforcement program conducted by the United States Environmental Protection Agency (EPA) through 1972 is described. During this period the activities of the federal government in direct enforcement of environmental regulations have increased enormously. Under early programs, the EPA placed only slight emphasis on enforcement. The focus chiefly was on research, field investigations, state program grants, and grants for construction of waste treatment facilities. The recent policy of the EPA has reversed this orientation to engage directly in enforcement. The vast majority of EPA enforcement activities have dealt with problems of water pollution. Most efforts have been directed against major sources of pollution such as large corporations or municipalities. It is the overall policy of the EPA, however, to obtain voluntary compliance with abatement procedures before resorting to formal proceedings. The dominant aspect of the new enforcement program is its concentration on individual cases and its readiness to proceed in the courts if necessary. (Proctor-Florida)
W75-02937

WATER LAW AND PRIVATE DECISION-MAKING: A CRITIQUE,
Indiana Univ., Bloomington.
J. W. Milliman.
Journal of Law and Economics, Vol 2, p 41-63, 1959. 34 ref.

Descriptors: *State governments, *Water law, *Water rights, *Decision-making, *Water allocation(Policy), Water supply, Water demand, Governments, Water supply development, Competing uses, Water resources development, Water policy, Planning, Reasonable use, Institutional constraints, Legal aspects, Legislation, Political aspects, Water resources non-structural alternatives, Appropriation, Riparian rights, Economic efficiency, Economics, Evaluation.
Identifiers: *Comparative law, *Water rights(Non-riparian), *State policy.

Presented are a survey and evaluation of state water law as it affects individual decision-making processes in the use and development of water resources. The basic theory is that rights to use water resources should be treated as real property. Water rights should be defined and given legal certainty so that allocation of water between competing uses and users can take place through the market mechanism. Although the appropriation doctrine is presently inadequate in many ways, it can be modified to provide the foundation for an improved system of water law. The riparian doctrine is ill suited to the development of transferable property rights in water resources in that it places major reliance upon judicial judgment for the allocation of water supplies. Many states are beginning to realize the inadequacies of riparian law and are moving toward the doctrine of appropriation. But rather than stress the opportunities which that doctrine offers for development of a market system, they are moving toward a system of centralized and non-market decision-making processes. Throughout state water law there seems to be a pervasive distrust of the use of the market mechanism to allocate water resources. (Deckert-Florida)
W75-02938

THE WANDERING MISSOURI RIVER--A STUDY OF ACCRETION LAW,
North Dakota Univ., Grand Forks.
R. E. Beck.
North Dakota Law Review, Vol 43, p 429-466, 1967. 163 ref.

Descriptors: *Missouri River, *Accretion, *Riparian rights, *Legal aspects, *Riverbeds, Avulsion, Judicial decisions, Banks, Water law, Water rights, Navigable waters, Ownership of beds, Riparian waters, Iowa, North Dakota, South Dakota, Equity, Interstate rivers, River training, Flow, Boundaries(Property), Meanders, Adjacent land owners, Bank erosion, River beds, Riparian land, Water policy, Soil conservation, Resource allocation, Natural resources, Property values.
Identifiers: *State policy, *Presumptions(Legal).

Controversies centering around the accretion of land by the Missouri River are explored as a case study of riparian law. There are six rationales for-

warded for the rule that accreted land belongs to the owner of the land to which it attaches: accession, similar to the rationale by which the owner of a cow owns its calf; the convenience of clear physical boundary; accretion is slow and thus of minimal importance to a losing land-owner over any short term; that the gaining owner is in the best position to make the accreted land productive; continuing access to the water by the gaining owner; and, finally, that accretion is a gain offset by the risk of loss later by the same natural process. None of these rationales is compelling. Historically accretion controversies arose between the sovereign and a private party; whereas modern situations are more likely to affect rights between two private parties where loss should not be assigned dogmatically. Rather equity must play the central role. Although the general rule of accretion must be retained, it should be tempered with a balancing of all competing interests, taking into account such factors as the likelihood of another shift in the river in a relatively short period before title to accreted land is transferred. The dogmatic application of a general rule will no longer suffice. (Salley-Florida)
W75-02939

CLEAN WATER--$1 BILLION,
Michigan Water Resources Commission, Lansing.
For primary bibliographic entry see Field 5G.
W75-02940

THE FLORIDA OIL SPILL AND POLLUTION CONTROL ACT, AN INTRUSION INTO THE FEDERAL MARITIME DOMAIN.
For primary bibliographic entry see Field 5G.
W75-02941

LEGAL ASPECTS OF COASTAL ZONE MANAGEMENT IN THE FLORIDA KEYS,
D. M. O'Connor.
Report submitted to Florida Coastal Coordinating Council, Tallahassee, March 1974. 55 p, 2 chart.

Descriptors: *Florida, *Governmental interrelations, *Comprehensive planning, *Administration, *Coasts, State governments, Federal government, Local governments, Administrative agencies, Legal aspects, Political aspects, Coordination, Decision making, Conservation, Regional development, Water policy, Water law, Legislation, Water quality, Water quality control, Water resources development, Environmental effects, Future planning(Projected).
Identifiers: *Coastal zone management, *Coastal waters.

The Florida Keys are entering what appears to be a period of intense development and as a result present an illustration of some of the problems involved in coastal zone management. In the Keys, these problems are presently being dealt with by fragmented authority at various governmental levels, federal, state, and local. The distribution of this authority is reviewed and the decisions which have been made concerning these problems are examined. The distribution of authority as it is exercised in practice is undesirable and is leading to polarization between development and conservation policies at local and state levels. While recognizing that considerable improvement could be made if the Keys are designated an 'area of critical state concern' under existing state land management legislation, the study recommends the creation of a Florida Keys Coastal Zone Management Authority. A state agency with overall planning and management responsibility would be designated with the power to apply for and receive federal funding and to manage the states overall coastal zone management program. The regional authority would administer the Keys segment of the state program and would include representation from the local communities. (Deckert-Florida)
W75-02942

RECLAMATION WATER RIGHTS,
Wyoming Univ., Laramie.
F. J. Trelease.
Rocky Mountain Law Review, Vol 32, p 464-501, 1960. 188 ref.

Descriptors: *Irrigation programs *Federal-state water rights conflicts, *Water rights, *Reclamation, *Irrigation systems, Federal jurisdiction, Governmental interrelations, Legislation, Administration, Governments, Prior appropriation, Riparian rights, Water resources development, Financing, Costs, State jurisdiction, Dams, Canals, Programs, Interstate rivers.
Identifiers: Injunctive relief, Administrative regulations, *State policy, Water rights(Non-riparians).

When the United States enacted the Reclamation Act of 1902, it entered the field of building large scale irrigation projects. The new U.S. policy of water development carried forward the much older policy of recognizing the state and territorial law as the source of water rights. Since the need for large dams and canals could not be met by private capital outlay, the Reclamation Act provided federal financing of irrigation projects. A section of the Act stipulates that the national program must accommodate the individual states' patterns and leave their water law relatively untouched. It also maintains the status quo of the law of interstate streams, makes water rights appurtenant to the land, and adopts the fundamentals of prior appropriation as the basic law of reclamation. Section 8 does not actually give the protection it appears to offer. Principally, injunctive relief cannot be obtained from Reclamation officials for alleged violations. In disputes between water users and Reclamation officials, vested state water rights offer only money damages. The federal courts are the final arbiters of state water law. (Dillingham-Florida)
W75-02943

A 50-MILE FISHERIES ZONE FOR OREGON.
Oregon Univ., Eugene. School of Law.
Ocean Law Memo, January 2, 1974. 4 p.

Descriptors: *Oregon, *Coasts, *Law of the sea, *Oceans, *State governments, Legal aspects, International law, Boundaries(Property), Federal government, Jurisdiction, Legislation, Commercial fishing, Marine fisheries, Fish management, International waters, Political constraints, Water resources development, Coordination, Regulation, Economic aspects, Decision making.
Identifiers: *Coastal waters.

The legality is discussed of coastal fishing zones extensions by state legislatures. The problem involves considerations of international law, constitutional law, and federalism. Regulation of fisheries has always been considered a function of ocean-bordering states within their own boundaries out to the three-mile limit. A state can regulate the conduct of anyone within its boundaries and can regulate the conduct of its citizens anywhere. If a state, Oregon in this case, wanted to increase its boundaries, it would need congressional approval because such an extension would encroach on federal jurisdiction over the high seas. These high seas are the property of the international community. The constitution grants exclusive power to the federal government to handle foreign affairs. It may be legal for the federal government to extend boundaries or exclusive fishing zones beyond the current twelve mile limit, but this would entail serious problems of enforcement. Passage of such acts by the states may be effective in attracting federal attention. Effective management of the ocean's resources will depend on cooperation among the fishing nations, rather than a division of the ocean into national lakes. (Sperling-Florida)
W75-02944

MANIFESTO FOR NATURAL RESOURCES,
Michigan Dept. of Natural Resources, Lansing.
R. A. MacMullan.
Michican Natural Resources, p 2-7, January/February 1969.

Descriptors: *Comprehensive planning, *Future planning, *Long-term planning, *Administration, *Adoption of practices, Decision making, Institutions, Government, Management, Methodology, Programs, Social aspects, Appraisals, Evaluation, State governments, Standards, Conservation, Recreation, Camping, Hunting, Ice fishing, Land use, Psychological impact, Scenery, Public benefits, Public lands, Land management, Natural resources, Social benefits.

Goals for the Michigan Department of Natural Resources are established in an environmental Bill of Rights. After noting the favorable atmosphere of public and governmental activism concerning natural resources, the Bill sets out six environmental rights which should inhere to each citizen. First is the right to live in a clean environment. Second is the right to increasing and more equal recreational opportunities. The rights to substantial natural resource education, to a varied and high quality recreational experience, to emotional participation in natural resources decisions, and finally, to a measure of solitude in the outdoors articulate the other rights to be forwarded by environmental activism. Encouraging growth of public awareness of resources conservation, and concern for the environment offers the opportunity to implement these 'rights.' Environmental rights must be developed for a rapidly expanding economy and a high-pressure society. They must simultaneously be protected from the dangers of that same economy and society. (Salley-Florida)
W75-02945

WATER RIGHTS LAW AND PUBLIC POLICIES RELATING TO GROUND WATER 'MINING' IN THE SOUTHWESTERN STATES,
Kansas State Univ., Manhattan.
For primary bibliographic entry see Field 4B.
W75-02946

ACCESS AND WHARFAGE RIGHTS AND THE TERRITORIAL EXTENT OF INDIAN RESERVATION BORDERING ON NAVIGABLE WATER--WHO OWNS THE BED OF FLATHEAD LAKE,
S. E. Haddon.
Montana Law Review, Vol 27, p 55-77, 1965. 141 ref.

Descriptors: *Riparian rights, *Legal aspects, *Indiana reservations, *Federal government, Public lands, Federal reservations, *Montana, Navigable waters, Lake beds, Water law, Water resources development, Judicial decisions, Legislation, Ownership(Property), Access routes.
Identifiers: *Public trust doctrine, *Flathead Lake(Mont).

The determination of Indian title in submerged lands in Flathead Reservation of Montana is discussed. Montana has accepted the view by both statute and case law that the owner of lands bordering on navigable waters takes title to the low water mark. The riparian owners on Flathead lake possess full access and wharfage rights which cannot be destroyed or infringed upon without compensation. This conclusion results from the fact that the United States as trustee for the tribes had no interest in the lands below the high water mark. This is based upon two theories. Either the lands were never held in trust for the Indians or any title which the United States did undertake to hold was extinguished upon the allotment and sale of the reservation lands, and by implication passed to the State of Montana and ultimately to the riparian owners. Even if title to the lake bed is held in trust, the United States would recognize riparian rights. (Proctor-Florida)
W75-02947

LEGAL QUICKSANDS IN OKLAHOMA RIVERBEDS,
C. E. Barnes.
Oklahoma Law Review, Vol 17, p 159-168, 1964. 46 ref.

Descriptors: *Oklahoma, *Accretion(Legal aspects), *Non-navigable waters, *Riverbeds, *Riparian rights, Avulsion, Legal aspects, Bank erosion, Streams, State governments, Judicial decisions, Legislation, Boundaries(Property), Ownership of beds, Adjacent landowners, Riparian waters, Water law, Meanders, Rivers, Riparian land, Adjudication procedure, Erosion, Soil conservation, Resource allocation, Water policy.
Identifiers: *State policy, *Water rights(Non-riparian), *Presumptions(Legal).

All but one of the streams in Oklahoma has been judicially determined to be non-navigable and state law holds that where different landowners control the opposite banks of non-navigable streams the streambed is common to both riparian owners. Despite the apparent simplicity of riparian rights afforded by the absence of navigable waters, considerable problems still exist in dealing with alteration of property lines through accretion and avulsion. The common law rule that accreted lands belong to the owner of the bank to which it attaches controls in Oklahoma, but where accretion formed an island, statutory rule was required. In such a case, the rights to the island vest in the riparian owners along an imaginary line through the middle of the stream. This leads to a further problem of determining where the center of a stream that fluctuates periodically is to be located. The Oklahoma Supreme Court ruled that the streambed is determined by the cut bank which carries the stream at the times of substantial flow. Avulsion, too, has presented legal problems, for instance, legal differentiation between avulsion and a more gradual change. There the courts held that if the change was imperceptible at any one time it represented gradual change. Further practical problems which must be considered relate to the issues of accretion and avulsion in mapping of new boundary lines, taxation of accreted lands, and the effect of accretions crossing state or county lines. (Salley-Florida)
W75-02948

STREAM POLLUTION--RECOVERY OF DAMAGES.
For primary bibliographic entry see Field 5G.
W75-02949

MARINE OIL POLLUTION CONTROL,
Coast Guard, Washington, D.C. Office of Research and Development.
For primary bibliographic entry see Field 5G.
W75-02950

WATER, WATER FOR THE WEALTHY,
P. Barnes.
New Republic, Vol 164, p 9-13, May 8, 1971.

Descriptors: *Irrigation, *Federal Reclamation Law, *California, *Arid lands, *Land reclamation, Reclamation states, Irrigation canals, Colorado River, Judicial decisions, Legislation, Irrigation program, Cost allocation, Cost transfer, Cost repayment, Agriculture, Dams, Canals, Crop production.
Identifiers: Imperial Valley(Calif).

California's Imperial Valley, one of the richest agricultural areas in the world, was once a barren desert. The productivity of the Imperial Valley is due to a network of canals and dams built by the federal government in the 1930's and 1940's which diverts water from the Colorado River. Discussed is the enforcement in the Imperial Valley of the Reclamation Act which sought to assure that the benefits of federal irrigation projects would accrue to small homesteaders by allowing only farms of 160 acres or less to receive federal water. Today more than half the irrigated acreage is held by owners of more than 160 acres. Recently a federal judge ruled in favor of the large land owner based on an opinion issued by Herbert Hoover's Secretary of the Interior in 1933. The inequities of the present situation are described. (Gragg-Florida)
W75-02951

WATER POLLUTION AND THE RULE OF LAW,
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-02952

COMMENTS AND RECOMMENDATIONS OF THE SECRETARY OF COMMERCE ON THE FIRST ANNUAL REPORT OF THE NATIONAL ADVISORY COMMITTEE ON OCEANS AND ATMOSPHERE,
Department of Commerce, Washington, D.C. Office of the Secretary.
P. G. Peterson.
September 27, 1972. 10 p.

Descriptors: *Oceans, *Law of the sea, *Weather modification, *Marine fisheries, *Coastal areas, Water law, Ecology, Fish, Fish management, United States, Adoption of practices, Legal aspects, Commercial fish, Fish farming, Project planning, United Nations, Foreign countries, Governments, International waters, Foreign waters, Water policy, Environmental sanitation, Environmental effects, Conservation, Political aspects, Weather.
Identifiers: *Coastal waters, *Coastal zone management.

The first annual report of the National Advisory Committee on Oceans and Atmosphere focused on four critical issues: the law of the sea, rehabilitation of fisheries, weather modification, and coastal zone management. The recommendations of the Committee will be considered in the formulation of new policies and programs. Deliberations in the United Nations will determine the extent and character of the rights and obligations of the nation towards the sea and its resources. The effectiveness of plans to revitalize the national fisheries will determine whether the fishing industry can survive. Methods of managing the coastal zone will determine whether the environment can be protected while it is being used to sustain the nations continued economic and industrial growth. The issues of weather modification concern the question of whether and how much new technology will be developed and used to manipulate environmental processes in the public interest. To strengthen the United States' interest in international ocean affairs it was recommended that the U.S. join with other countries in joint projects. (Sperling-Florida)
W75-02953

INDUSTRY STEPS IN TO SAVE THE LAND.
U.S. News and World Report, Vol 74, p 63-64, March 19, 1973.

Descriptors: *National parks, *Conservation, *Land use, *Economic aspects, *Land appraisal, *Land resources, Natural resources, State governments, Recreation, Federal government, Administrative agencies, Social aspects, Scenery, Land development, Land management aesthetics, Environmental sanitation, Value, Wildlife conservation, Marshes, Wetlands, Ecology, Legal aspects, Legislation, Taxes, Assessments, Direct costs, Operating costs, Tax rate, Nonstructural alternatives.

There is now a trend for industry to save many natural sites endangered by encroaching civilization. A multimillion dollar stretch of woodlands in Minnesota was given by the Northern States Power Company to the nation. Gulf Oil also donated to the nation land that fronted on the Pacific Ocean. Much of the land being donated is prime wildlife area. Federal law permits companies to take tax deductions of fifty cents on the dollar of appraised value. The total value of donations by all companies in the past five years is estimated at between fifty and one-hundred million dollars. In several instances the land was transferred to the states or federal government for preservation. In addition to the tax benefits, publicity from such gifts is beneficial to the donating corporation. Private groups are often favored as recipients because they can take over parcels quickly, unlike state and federal agencies, which have to wait for legislation. Conservation organizations eventually, in many cases, transfer the property to public bodies, such as the National Park Service. There is a need for new parks and sanctuaries, a need that can be filled with the help of individuals and corporations. (Sperling-Florida)
W75-02954

ENVIRONMENTAL LAW: SUMMARY OF THE FEDERAL WATER POLLUTION CONTROL ACT (AMENDMENTS OF 1972),
Datatronic Systems Corp., Panorama City, Calif.
For primary bibliographic entry see Field 6G.
W75-02956

EPA WATER STRATEGY PAPER,
For primary bibliographic entry see Field 5G.
W75-02957

SOURCE-BASED EFFLUENT LIMITATIONS,
For primary bibliographic entry see Field 5G.
W75-02958

OCEAN DUMPING PERMIT PROGRAM,
For primary bibliographic entry see Field 5G.
W75-02959

EPA POLICY DIRECTIVES,
For primary bibliographic entry see Field 5G.
W75-02960

PRETREATMENT STANDARDS,
For primary bibliographic entry see Field 5G.
W75-02961

OBSTRUCTING AND POLLUTING FLOW OF WATER,
N.C. Gen. Stat., sec. 113-265 (1971).

Descriptors: *Fish conservation, *Fish management, *Legislation, *Water flow, *Water pollution sources, Fish harvest, *North Carolina, Water farming, Pollutants, Water conservation, Enforcement, Fish control, Fisheries, Fish passages, Fish migration, Fish barriers, Fish populations, Decomposing organic matter.

A prohibition is established upon obstructing, polluting or diminishing the natural flow of water into or through any fish hatchery in violation of the requirements of the North Carolina Department of Water Resources and the State Stream Sanitation Committee. It is unlawful to cause fish offal to be thrown into the channel of any navigable waters which will hinder the passage of fish. Further restrictions upon the throwing of fish offal in any coastal fishing waters or inland fishing waters are provided. Misdemeanor sanctions may be imposed upon those unlawfully removing fish from traps and nets in open state waters, upon managers of vessels unlawfully injuring any seine or net fixed for the purpose of taking fish, and upon any person who willfully destroys or damages any buoys, markers, stakes, nets, or other devices or property lawfully set out in the open waters of the state in connection with fishing. (Proctor-Florida)
W75-02962

AUTHORIZING THE SECRETARY OF THE INTERIOR TO CONSTRUCT, OPERATE, AND MAINTAIN IN THE NARROWS UNIT, MISSOURI RIVER BASIN PROJECT, COLORADO,
House, Washington, D.C.
H. R. Rep. No 1415, 91st Cong, 2nd Sess, 1970. 5 p.

Descriptors: *Legislation, *Colorado, *Water Quality Act, *Water quality control, *Water quality standards, Water pollution, Water pollution control, Pollution abatement, *Missouri River, River basins, River basin development, Water policy, Water law, Regulation, Irrigation, Cost repayment, Cost allocation, Federal project policy.

A report is presented on the disagreeing votes of the two Houses on the amendment of the House to a Senate bill authorizing the Secretary of the Interior to construct, operate and maintain the Narrows unit, Missouri River Basin project, Colorado. The House version of the bill contains a proviso requiring that all identifiable return flows of water from the project be treated to abate pollution and enhance water quality. The substitute language adopted by the conferees requires that the project be operated in such manner as to not cause the South Platte River to be in violation of applicable water quality standards. These water quality standards have been proposed by the State of Colorado for the South Platte River pursuant to the Water Quality Act of 1965, and have been approved by the Secretary of the Interior. The House version also contains a provision extending water user contracts for a full term of fifty years if necessary to accomplish irrigation repayment. (Ritchie-Florida)
W75-02963

FEDERAL WATER POLLUTION CONTROL ACT--AMENDMENTS--LEGISLATIVE HISTORY,
U.S. Code Congressional and Administrative News, p 5620-5622, 1973.

Descriptors: *Waste water treatment, *Water pollution treatment, *Administrative agencies, *Water pollution control, Reimbursable costs, Initial costs, Government supports, Municipal wastes, Sewage effluents, Sewage disposal, Sewage treatment, Treatment facilities, Waste storage, Impaired water quality, Water law, Wastes, Water quality control, Legislation, Construction, Federal Water Pollution Control Act, Water quality standards, Government finance.

This bill authorizes a one-year extension of the pilot operator training program for waste water treatment plants, set up under the Federal Water Pollution Control Act. The extension is necessary since the increasing number of water treatment plants and the new and more sophisticated equipment increases the need for operator training. The authorization for reimbursement of up to 55 percent of project costs for eligible sewage treatment plants on which construction was initiated between June 30, 1966 and July 1, 1972 is increased by six hundred million dollars. Congress desires to redeem the federal pledge to make reimbursement payments and to provide the financial assistance necessary to enable state agencies to continue their own water pollution control programs. The reimbursement to publicly owned treatment works will be for the difference between the amount received as federal financial support and 50 percent of total cost, provided the project was approved by the appropriate state water pollution control agency and met the requirements of the Water Pollution Control Act in effect at the time the project was initiated. (Kelly-Florida)
W75-02964

WILLIAM P. PRICE, ET AL. V. GEORGIA INDUSTRIAL REALTY CO. ET AL. (ACTION FOR DECLARATORY RELIEF AS TO WHETHER DEFENDANT'S HAD OBTAINED AN EASEMENT OR RIGHT OF DRAINAGE THROUGH PLAINTIFF'S PROPERTY AND FOR DAMAGES FROM ABATABLE NUISANCE),
207 S.E. 2nd 556 (Ct. App. Ga. 1974).

Descriptors: *Georgia, *Judicial decisions, *Surface runoff, *Adjacent land owners, *Legal aspects, Discharge(Water), Land tenure, Water law, Repulsion(Legal aspects), Easements, State jurisdiction, Legal review, Negligence, Third party effects, Trespass, Surface waters, Real property, Overland flow, Runoff, Topography, Drainage effects, Drainage, Prescriptive rights, Adjudication procedure, Adoption of practices.
Identifiers: *Liability(Legal aspects), *Nuisance(Legal aspects), Declaratory judgments.

Plaintiff landowners brought these actions against two corporate defendants seeking declaratory relief as to whether defendants had obtained an easement or right of drainage through plaintiffs property, and for damages for abatable nuisance and for increased flow of water discharged on their property due to construction by third party on adjoining property. In a prior action against the defendents for the 'great injury and irreparable damage' done to the plaintiffs' land, the plaintiffs had been awarded a general verdict for damages in an amount equal to the decrease in market value of plaintiffs property. The lower court granted the defendants' joint motion for summary judgment and plaintiffs appealed. The Court of Appeal of Georgia affirmed and ruled that the earlier general verdict covered the plaintiff's claim for permanent damage and injury to their property, thus the doctrine of res judicata barred any further recovery based upon creation or maintenance of the nuisance alleged in changed topography of the land and flow of water. The court also ruled that the defendants were not liable for wrongful actions, if any, of third parties who acquired parcels of land from the defendants and whose activities allegedly resulted in increased water flow on plaintiffs' property. (Deckert-Florida)
W75-02965

COMMONWEALTH V. DERRY TOWNSHIP (ACTION FINDING TOWNSHIP IN CONTEMPT FOR NONCOMPLIANCE WITH D E R ORDER),
314 A. 2nd 874 (1973).

Descriptors: *Adjudication procedure, *Water pollution control, *Pennsylvania, *Administrative agencies, *Waste water treatment, Judicial decisions, Legal aspects, Water law, Regulation, Legal review, Legislation, Water quality control, Water pollution, State governments, Water policy, Local governments, Governmental interrelations, Sewage water, Water supply, Water distribution(Applied).
Identifiers: *Administrative regulations, *State policy.

Respondent township filed exceptions to an order of the Commonwealth Court of Pennsylvania finding the township in contempt for failure to comply with an order of the Pennsylvania Department of Environmental Resources (DER) directing the township to construct and operate sewage systems and sewage treatment facilities. The township had previously been serviced by the sewage system of a neighboring borough. Because the existing system did not meet DER standards, the respondent and other neighboring communities were ordered by the DER to develop their own sewage facilities. The respondent was found in contempt for failing to comply with their order. The Commonwealth Court held that the township, by failing to appeal the action of the DER as provided by statute, waived its right to a hearing and could not claim to have been denied constitutional due process. The court further held that it was not improper to use a petition to adjudge the township in contempt, and finding the township in contempt was not contrary to the law and evidence. Accordingly, the exceptions were dismissed. (Deckert-Florida)
W75-02966

CITY OF NORTH MIAMI, FLORIDA V. TRAIN (ACTION BY CITY FOR DECLARATORY RELIEF, MANDAMUS AND INJUNCTION TO PREVENT APPROVAL OF FUNDING TO CONSTRUCT REGIONAL WATER FACILITIES),
337 F. Supp. 1264 (S.D. Fla. 1974).

Descriptors: *Florida, *Judicial decisions, *Sewage disposal, *Environmental effects, *Outfall sewers, Water law, Legal aspects, Alternative planning, Water pollution, Waste treatment, Waste disposal, Local government, Federal government, Governmental interrelations, Disposal, Sewage, Treatment, Facilities, Underground waste disposal, Deep wells, Legal review, Administrative agencies, Water pollution sources, Water quality control, Injection wells, Waste water disposal.
Identifiers: *FWPCA Amendments of 1972, *National Environmental Policy Act, *Environmental impact statement, Declaratory judgments, Injunctive relief.

Plaintiff municipality brought action against the defendant federal agency and various administrators for declaratory judgment, mandamus, and injunctive relief to prevent the defendant from approving applications by the county for funds to construct regional water treatment facilities. The proposed treatment plan would utilize the ocean disposal and deep well injection methods for disposal of treated effluent. The plaintiff contended that the environmental impact statements prepared by the defendant were inadequate in that certain alternatives to ocean disposal, particularly land application, were not explored in sufficient detail. Plaintiff further alleged that the defendant demonstrated a 'predisposition' against land application and in favor of ocean disposal, contrary to the intent of the National Environmental Policy Act. A Federal District Court in Florida ruled that the statements provided sufficient information on the environmental effects of alternative disposal methods to permit a reasonable choice and thus were not inadequate. Granting the defendant's motion for summary judgment, the court ruled that the defendant was entitled to reject the land application method on the basis of overriding environmental factors and that certain actions of the defendant did not show any predisposition in favor of ocean disposal. (Deckert-Florida)
W75-02967

WATER POLLUTION,
Mo. Stat. Ann., Ch. 204, secs .006 to .141. (Supp 1974).

Descriptors: *Missouri, *Legislation, *Water quality, *Water pollution, *Water pollution control, Water quality standards, Pollution abatement, Water policy, Federal Water Pollution Control Act, Permits, Water pollution sources, Interagency cooperation, Government finance, Wastes, Waste disposal, Waste treatment, Water conservation, Water law, Water pollution treatment.

The Clean Water Commission of the State of Missouri is created for the purpose of carrying out the public policy as defined by the act. That policy requires conserving and improving the waters of the state for domestic, agricultural, industrial, recreational and other legitimate beneficial uses. It also provides that no waste be discharged into any waters of the state without receiving the treatment necessary to meet the requirements of the Federal Water Pollution Control Act as amended. The Commission is charged with providing for the prevention, abatement and control of new or existing water pollution. The Commission is also charged with cooperating with other state and federal agencies in carrying out these objectives. Various definitions of terms contained within the act, and the specific duties of the Commission are included. Various specific types of waste discharge are proscribed and procedures and requirements are detailed for the issuance of per-

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mits. Provisions for funding programs designed to effectuate the Act are included. (Ritchie-Florida)
W75-02968

THE STATE OF ILLINOIS, ET AL. V. CITY OF MILWAUKEE (SUIT TO ABATE NUISANCE--DISPOSAL OF RAW SEWAGE IN NAVIGABLE WATERS).
1 Pollution Control Guide, Vol 3, paragraph 15027, 15238-15241, 1974.

Descriptors: *Federal Water Pollution Control Act, *Lake Michigan, *Water pollution sources, *Judicial decisions, Navigable waters, Legal aspects, State governments, Local governments, *Illinois, *Wisconsin, Water quality control, Water pollution, Adoption of practices, Coordination, Water law, Legislation, Water pollution control, Regulation.
Identifiers: Nuisance(Legal aspects), Injunction, FWPCA Amendments of 1972, State policy, Territorial waters.

A state's right to use federal common law to seek abatement in federal court of a public nuisance in navigable waters has not been preempted by the 1972 Amendments to the Federal Water Pollution Control Act. The language of the Amendments and their legislative history indicate that Congress did not intend to destroy any remedies previously available to the states. In this case the state of Illinois challenged the practice of the City of Milwaukee, Wisconsin, of depositing raw sewage in Lake Michigan. This discharge allegedly caused pollution of Illinois territorial waters in Lake Michigan. Illinois seeks an injunction against this Milwaukee practice. The Federal Water Pollution Control Act declares the policy of Congress is to recognize, preserve, and protect the primary responsibilities and rights of the states in preventing and controlling water pollution. Under other acts, the policy of Congress has been the same in placing primary responsibility for implementation on state and local governments. (Sperling-Florida)
W75-02973

UNITED STATES V. ASHLAND OIL AND TRANSPORTATION CO. (OIL DISCHARGE INTO NON-NAVIGABLE STREAM).
1 Pollution Control Guide, Vol 3, sec 15035, p 15282-15284, February 12, 1974.

Descriptors: *Federal Water Pollution Control Act, *Navigable waters, *Pollutants, *Oil, *Judicial decisions, Streams, Water pollution, Regulations, Water quality, Water quality standards, Legislation, Jurisdiction, United States, Pollution, Federal government, Shores, Oil pollution, Pollution abatement, Water pollution control, Adjudication procedures, Environmental effects, Adoption of practice.
Identifiers: Information(Prosecution), Hazardous substances(Pollution), Environmental policy.

Criminal action was brought by plaintiff United States charging defendant oil company with discharging oil into the waters of the United States and not immediately notifying the appropriate federal agency pursuant to the Federal Water Pollution Control Act Amendments of 1972. Defendant contended that the governing section of the Act applied only to the classical 'navigable waters of the United States' and, therefore, did not provide jurisdiction over discharges into 'waters of the United States' as alleged in the Information . Defendant also contended that the stream in which the discharge occurred was not 'waters of the United States' since it was not navigable and since it did not have a sufficient connection with interstate commerce for it to be regulated by the federal government under the Commerce Clause of the Constitution. The Federal District Court found both contentions of defendant lacking. Congress clearly may legislate a criminal provision that does not require the government to prove interstate commerce effects said the court. Finding the evidence against defendant, the court, thereupon, denied motion for acquittal and entered a verdict of guilty. (Chennault-Florida)
W75-02974

UNITED STATES V. GENERAL AMERICAN TRANSPORTATION CORP. (DISCHARGE OF REFUSE INTO NAVIGABLE WATERS).
1 Pollution Control Guide, Vol 3, paragraph 15050, p 15373-15378, March 18, 1974. 18 ref.

Descriptors: *Federal Water Pollution Control Act, *Rivers and Harbors Act, *Oil pollution, *Navigable waters, *Judicial decisions, Wastes, Oil spills, Damages, United States, Legislation, Ships, Pollution, Federal government, Solvents, Adjudication procedure, Administration, Administrative agencies, Oil wastes, Pollution abatement, Chemical wastes, Legal aspects.
Identifiers: *Refuse Act of 1899, Information(Legal aspects), Immunity(Legal aspects).

Plaintiff Government brought an Information against defendant corporation alleging eight counts of discharging various chemical and petroleum products into navigable waters of the United States in violation of the Refuse Act of 1899. Defendant moved to dismiss seven counts contending compliance with the notice-of-discharge provision of the Federal Water Pollution Control Act. That Act confers immunity to the 'person in charge' which precludes governmental use of such notice or Information obtained therefrom in any subsequent prosecution. The government contended that the Act extends immunity only to natural persons, not corporations. The court concluded contrarily. The Government next contended that, even if corporations are entitled to immunity under the Act, defendant here did not qualify for such immunity because it had not been shown that the discharge was reported by a person of major responsibility. Resorting to the law of agency, the court concluded that any number of personnel could have effectively reported on behalf of defendant. The court then decided the pretrial motion of defendant to dismiss count two of the information but granted leave to renew both motions at trial. (Chennault-Florida)
W75-02975

REPORT OF PROCEEDINGS AT PUBLIC HEARING CONCERNING RECLASSIFICATION OF CERTAIN WATERS--THE UPPER CAPE FEAR RIVER BASIN (FROM SOURCE TO THE HARNETT-LEE COUNTY LINE), UPPER ROANOKE RIVER BASIN (FROM SOURCE TO CASWELL-PERSON COUNTY LINE), AND YADKIN-PEE DEE RIVER BASIN.
North Carolina Dept. of Natural and Economic Resources, Raleigh. Office of Air and Water Resources.
For primary bibliographic entry see Field 5G.
W75-02976

REPORT OF PROCEEDINGS AT PUBLIC HEARING CONCERNING THE RECLASSIFICATION OF VARIOUS STREAMS IN THE BROAD, CATAWBA, FRENCH BROAD, HIWASSEE, LITTLE TENNESSEE, NEW AND WATAUGA RIVER BASINS.
North Carolina Dept. of Natural and Economic Resources, Raleigh. Office of Water and Air Resources.
For primary bibliographic entry see Field 5G.
W75-02977

ANALYSIS OF THE IMPACT OF LEGAL CONSTRAINTS ON GROUNDWATER RESOURCE DEVELOPMENT IN IDAHO,
Idaho Bureau of Mines and Geology, Moscow.
For primary bibliographic entry see Field 4B.
W75-02981

AEROBIC TREATMENT OF FARM WASTES,
New Zealand Agricultural Engineering Inst., Lincoln.
For primary bibliographic entry see Field 5D.
W75-02994

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-03000

DEVELOPMENTS IN THE OCEAN RIGHTS OF LAND-LOCKED NATIONS,
North Carolina Univ., Chapel Hill. School of Law.
R. I. Weisberg.
In: Current Aspects of Sea Law, Sea Grant Publication UNC-SG-74-03, p 18-27, March 1974. 46 ref.

Descriptors: *International law, *Treaties, *Access routes, *Legal aspects, *Law of the sea, Foreign trade, foreign waters, International waters, Natural resources, Resources development, Coasts, Beds, Ownership of beds, Beds under water, Oceans.

As the ever-increasing importance of the resources of the sea becomes evident, the land-locked nations of the world have grown more anxious to establish rights of access to the oceans. A broadening of scientific and economic expectations has stimulated an upsurge on the part of coastal states to assert claims to the high seas and to the seabeds. Inland nations are concerned that they, too, share in the future extractions of wealth from the sea. Traditionally, these countries have sought to gain access to the sea by relying on natural law, servitudes of necessity, and the freedom of the seas as legal justification for their demands. These arguments have been met with little enthusiasm, and as a result, inland states have had to resort to bilateral treaties with neighboring coastal states. These treaties have not been altogether satisfactory for the land-locked signatories, due to their contractual disadvantage. As a result, recent efforts have been made to codify rules for access to the oceans, principally through the United Nations, international conventions and to some extent the International Court. As increasing numbers of countries participate such efforts will become more successful. (Ritchie-Florida)
W75-03001

AN INVESTIGATION OF THE FEDERAL, STATE, AND LOCAL OIL SPILL CONTINGENCY PLANS FOR THE LONG ISLAND SOUND AREA,
State Univ. of New York, Stony Brook. Marine Sciences Research Center.
For primary bibliographic entry see Field 5G.
W75-03002

RECENT TRENDS IN THE DEVELOPMENT OF THE LAW OF UNDERSEA INSTALLATIONS,
North Carolina Univ., Chapel Hill. School of Law.
J. MacDonald.
In: Current Aspects of Sea Law, Sea Grant Publication UNC-SG-74-03, p 28-34, March 1974. 36 ref.

Descriptors: *International law, *Oceans, *Jurisdiction, *Ownership of beds, *Natural resources, Structures, Marine biology, Continental shelf, Water law, Coasts, Resources development, International waters, Beds underwater.
Identifiers: Coastal zone management.

While man has utilized the resources of the sea for several thousand years through fishing, he has left largely untapped the vast resources of the ocean bed. To implement the recovery of these resources

and to carry on other scientific operations, the installation of seabed structures and facilities will be required. With the installation of seabed structures, questions as to their placement, ownership, scope of activities and liability will arise. There is very little international law dealing with undersea installations. This paper analyzes two emerging principles. First, an international zone on the deep sea bed where undersea installations are subject to international control should be created. Second, the use of undersea installations should be restricted to peaceful purposes. In order to achieve the goal of peaceful development of seabed resources for the benefit of all people, countries must adopt international controls which would regulate undersea installations and operations. (Ritchie-Florida)
W75-03003

ENVIRONMENTAL POLICY AND POLITICAL DECISIONS: THE RECONCILIATION OF FACTS, VALUES, AND INTERESTS,
Colorado State Univ., Fort Collins. Dept. of Political Science.
N. Wengert.
In: Biological Effects In The Hydrological Cycle, Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana. p 367-378, 17 ref.

Descriptors: *Decision making, *Political aspects, Motivation, Social aspects, Environment, Methodology, Political constraints, Institutions, Value, Interest, Attitudes, Social participation, Social values, Governments.

The proposition was advanced that courses of action to protect and enhance the environment are often confused and uncertain, that the needed decisions require choices with respect to both ends and means, and that such decisions are uniquely political. All decisions, particularly public sector decisions, involve choices--choices as to ends and choices as to means, choices at the grand level, and choices at the small level. Even conditioned responses require earlier deliberate decisions. Three focal points of the political process may be identified: the actors in the process; the institutions that determine how they act, i.e., the framework for decisions; and the substantive problems with which the process deals. At each of these points, ideas, ideals, norms, and ideology (the values) of the participants, of the institutions, and of those associated with the definition and solution of particular problems, are important influences in what is done and how it is done. The reconciliation of facts, values, and interests is no easy task. Perhaps it can be accomplished more wisely, if not more easily, by continued efforts to improve the rational basis for decisions and to increase consequent and responsible behavior on the part of those involved--citizens, groups, bureaucrats, officials, and politicians. (See also W75-03023) (Humphreys-ISWS)
W75-03039

REGIONAL GOVERNMENTAL ARRANGEMENTS IN METROPOLITAN AREAS: NINE CASE STUDIES,
Institute for Community Studies, Kansas City, Mo.
C. J. Hein, Joyce M. Keys, and G. M. Robbins.
Copy available from GPO Sup Doc as EP1.23:600/5-74-024, $3.15. Environmental Protection Agency, Socioeconomic Studies Series, Report EPA-600/5-74-024, January 1974. 240 p, 24 fig, 15 tab, 190 ref. EPA Program Element 1HA098, Grant 801500.

Descriptors: *Regional analysis, Regions, *Governmental interrelations, *Cities, State governments, Organizations.
Identifiers: *Regional governments, *County governments, Intrastate.

A review of the experience with major forms of regional government in metropolitan areas. Within four broad categories, case studies were done of nine different types of regional governmental arrangements. Findings were that the core of what is called metropolitan government in the United States is the county, usually reorganized and given urban powers. There are no multi-county general purpose metropolitan governments in the United States. Another frequently suggested model, the multi-county, multi-purpose metropolitan special district also apparently does not exist in the United States. Patterns of regional governmental arrangements based on the urban county were judged more effective in dealing with emerging environmental management problems than patterns based on special districts and regional councils of government; the two-tier federation was judged about equal to the best of the urban county arrangements. In virtually every case, further state action was needed to make the regional arrangements more effective. Metropolitan regional reorganization has occurred in over 20% of the states, and therefore should be possible in most urban states. (EPA)
W75-03053

THE ROLE OF LAKE PROPERTY OWNERS AND THEIR ORGANIZATIONS IN LAKE MANAGEMENT,
Wisconsin Univ., Madison. Inland Lake Demonstration Project.
L. L. Klessig, and D. A. Yanggen.
Report G2548, December 1973. 16 p, 2 tab.

Descriptors: *Land management, Legal aspects, Local governments, Land use, Lakes, Recreation, *Wisconsin, Institutions, Social aspects, Decision making, Social participation, Surveys.
Identifiers: *Property owners, Special districts.

Because lake management programs are becoming more important, and much of this management will be undertaken locally, it is important to know who the local lake property owners are; why they own their property; what they view as the lake's major problems; and how they have attempted to resolve them. To answer these questions 1,183 questionnaires from lake property owners in 19 northern counties were evaluated. Only 18 percent of the lake owners live there permanently. Seventy percent of the seasonal owners purchased their lots for leisure time use. A majority of the respondents viewed fish stocking, property taxes, enforcement of building and septic system codes, monitoring of pollution sources, and patroling for vandalism as needs to be pursued. Respondents' activities to solve these problems have been limited, in part because seasonal residents cannot vote in local elections, but do include lobbying and organizing. Voluntary or mandatory organizations, often created through covenants and special districts, are often utilized to solve many of these lake management problems. Their effectiveness depends upon the managerial ability and personality required. Recent Wisconsin legislation designed to create local lake protection and rehabilitation districts is also assessed. (Schroeder-Wisconsin)
W75-03138

THE POLITICAL ECONOMY OF REGIONAL WATER INSTITUTIONS,
Arizona Univ., Tucson.
H. M. Ingram.
American Journal of Agricultural Economics, Vol 55, No 1, p 10-18, 1973. 26 ref.

Descriptors: *Political aspects, *Water resource development, *Interstate commissions, *Institutions, Planning, Water districts, River basin commissions, Regional analysis.
Identifiers: *Regional water institutions.

Several authors have viewed the development of multistate regional water institutions (MSRI) as a solution to a number of regional water-related problems--e.g., quality, quantity, water-based recreation, etc. Research on developing such MSRI has centered almost exclusively on their technical and economic feasibility. As a unifying and innovating force, however, most MSRI developed have been disappointing. Much of this failure can be attributed to the failure to account for political viability. To be viable, MSRI must tailor actions to build support while simultaneously such support building may compromise their ability to approach resource problems in a comprehensive, coordinated, and regional manner. The incentives and non-incentives of four interest groups--states, federal agencies, private interests, and governors--to participate in several MRSI institutions are explored. Often MRSI membership represents a defense either against federal intervention or interbasin water transfers instead of positive attempts to achieve longer regional goals. Several strategies of organization are described, illustrating a single point--when interests conflict and goals are not agreed on, the necessary ingredients for cooperation and coordination cannot be realized by an organization. Future social science research must add a third parameter, political feasibility, in order to understand the behavior of decision makers. (Schroeder-Wisconsin)
W75-03147

TWO NATIONS, ONE LAKE--SCIENCE IN SUPPORT OF GREAT LAKES MANAGEMENT. OBJECTIVES AND ACTIVITIES OF THE INTERNATIONAL FIELD YEAR FOR THE GREAT LAKES 1965-1975,
National Oceanic and Atmospheric Administration, Rockville, Md.
For primary bibliographic entry see Field 2H.
W75-03179

LOUISIANA SUPERPORT STUDIES. REPORT 3. RECOMMENDATIONS FOR THE ENVIRONMENTAL PROTECTION PLAN,
Louisiana State Univ., Baton Rouge. Center for Wetlands Resources.
For primary bibliographic entry see Field 6G.
W75-03183

THE MARINE ENVIRONMENT--USE AND ABUSE, ORDER OR CONFLICT--PART 1,
Aquamarine International Ltd., London (England).
For primary bibliographic entry see Field 5G.
W75-03198

INTEGRATING WATER QUALITY AND WATER RESOURCES PLANNING,
Office of Land Use and Water Planning, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-03227

COLUMBIA INTERSTATE COMPACT: LEGISLATIVE ROLL-CALL ANALYSIS,
Washington State Water Research Center, Pullman.
H. R. Doerksen.
Paper presented at Pacific Northwest Political Science Association Meeting, Pullman, Washington, April 27, 1973. 20 p, 11 tab. OWRT A-055-WASH(1), 14-31-0001-3848.

Descriptors: Administration, *Columbia River, *Interstate compacts, *Pacific Northwest, U.S., *Washington, Water resources development, Political aspects, Regional analysis, Regression analysis.

The purpose of this paper was to use statistical analysis to attempt to evaluate the factors most responsible for the defeat of the Columbia Interstate Compact in the Washington State Legislature. Basically, the research will test the hypothes-

is that the Columbia Interstate Compact failed to be passed in the Washington State Legislature because it became embroiled in a conflict over power marketing. The hypothesis was tested by a variety of approaches. First, reference was made to the political climate in the Legislature which suggests the validity of the hypothesis. Second, roll-call voting behavior was evaluated in terms of power-related constituency factors. Third, roll-call voting on the Columbia Interstate Compact was compared with roll-call voting on a controversial power bill. Finally, multiple regression techniques were used to determine the extent to which variance in voting may be explained by power-related factors, in addition to the influence of party affiliation. The data were consistent with the hypothesis that the Compact failed in the Washington Legislature because it became embroiled in an existing ideological conflict over power generation and marketing.
W75-03276

REGULATION OF GREAT LAKES WATER LEVELS--APPENDIX B--LAKE REGULATION, VOL 1,
International Joint Commission-United States and Canada. Great Lakes Levels Board.
For primary bibliographic entry see Field 2H.
W75-03277

POLLUTION--APPLICABILITY OF CHAPTER 376, FLORIDA STATUTES, TO SUBSTANCES OTHER THAN THOSE SPECIFICALLY LISTED,
Op Att'y Gen Fla 073-432 (1973). 4 p.

Descriptors: *Florida, *Water pollution sources, *Legislation, *Pollutants, Oil wastes, Pesticides, Federal Water Pollution Control Act, Waste, Shores, Water discharge, Coastal areas, Federal government, Permits, Water quality control, Water conservation, Waste water disposal, Navigable waters, United States, Shellfish, Fish, Wildlife, Beaches, Recreation, Gasoline, Industrial wastes.
Identifiers: *Contiguous zone, *Hazardous substances(Pollution), *Coastal waters.

The opinion of the attorney general of Florida is that the term 'pollutants' in Section 376.031(7) of the Florida Statutes is not limited to oil, gasoline, pesticides, or ammonia. Proper stautory construction of the term ' other hazardous materials', requires a reading not only of several sections of the Florida Statutes, but the Federal Water Pollution Control Act as well. The statute forbids discharges into coastal waters. The Florida Statutes do not define 'other hazardous substances', but specify the legislative intent to support and complement the Federal Water Quality Improvement Act of 1970. 'Hazardous substances' are defined therein as elements which, when discharged in quantity into the navigable waters of the Unites States, Shorelines, or the contiguous zone, present a danger to the public health or welfare, including fish, shellfish, wildlife, shorelines and beaches. Substances which interfere with outdoor recreation also fall into this category. The only substances specifically excluded are liquified petroleum gas and industrial effluents discharged pursuant to a permit. (Sperling-Florida)
W75-03278

PROPOSED REGULATIONS FOR THE DISPOSAL OF WASTEWATER IN SUBDIVISIONS.
Missouri Clean Water Commission, Jefferson City.
For primary bibliographic entry see Field 5G.
W75-03279

MR. JUSTICE DOUGLAS, DISSENTING,
W. O. Douglas.
The Living Wilderness, p 19-29, Summer 1972. 2 photo, 9 ref.

Descriptors: *Legal aspects, *Judicial decisions, *Environmental control, *Administrative agencies, *Non-structural alternatives, Environment, Environmental effects, Habitats, Rivers, Lakes, Streams, Soil environment, National parks, National recreation areas, National wildlife refuge, National forests, Federal government, Social aspects, Political aspects.
Identifiers: Standing(Legal).

Reproduced is Mr. Justice Douglas' dissent in Sierra Club v. Morton. In that case the United States Supreme Court held the Sierra Club did not have standing to sue to stop a commercial development by Walt Disney Enterprises, Inc., in Mineral King Valley, adjacent to Sequoia National Park in California. Justice Douglas argues for fashioning a federal rule of standing that allows environmental issues to be litigated before federal agencies or federal courts in the name of the inanimate object about to be despoiled. Just as ships and corporations have legal personalities for suit purposes, so should valleys, meadows, rivers, lakes, trees and air. Legitimate spokesmen are those who have an intimate relationship with the inanimate object, such as campers, vistors, fishermen, loggers and canoeists. Federal agencies charged with protecting the public interest are generally industry-minded, and not therefore representative of the natural resource involved. Therefore, before these priceless bits of Americana are forever lost, the voices of existing beneficiaries of these environmental wonders should be heard. (Craig-Florida)
W75-03280

CITIZEN ENFORCEMENT OF THE REFUSE ACT: QUI TAM PRO DOMINO REGE QUAM PRO SE IPSO IN HOC PARTE SEQUITUR FLOPS; MANDAMUS NEXT,
For primary bibliographic entry see Field 5B.
W75-03282

6F. Nonstructural Alternatives

THE ENVIRONMENTAL PROBLEMS IN AN URBAN FLOOD CONTROL PLANNING,
Taiwan Water Resources Planning Commission, Taipei.
S. M. Yin.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 114-123. 2 fig, 8 ref.

Descriptors: *Flood control, *Planning, *Flood discharge, *Flood plain zoning, *Flood protection, Flood waves, Floodways, Environmental effects, Social aspects, Management, Social impact, Social values, Economic impact, Typhoons.
Identifiers: *Taiwan(Tanshui River).

Aspects of flood control planning in the Taipei Basin in Taiwan were discussed. The Tanshui River is the only outlet from a basin surrounded by mountains, and it suffers severe and frequent flooding from typhoons. The basin was described in detail including historical development and recent projects. Meteorological and hydrologic aspects of the area were related to the basin geometry and land use. The social nature of the basin was discussed as were the potential economic problems and solutions. Extensive relocation of the population in areas of the floodplain is one of a number of solutions that were covered. (See also W75-02751) (Terstriep-ISWS)
W75-02760

FLOODS IN IOWA: A COMPARATIVE STUDY OF REGIONAL FLOOD FREQUENCY METHODS,
Geological Survey, Iowa City, Iowa.
For primary bibliographic entry see Field 2E.
W75-03161

6G. Ecologic Impact Of Water Development

WATER FOR THE HUMAN ENVIRONMENT, VOLUME III, TECHNICAL SESSIONS.
For primary bibliographic entry see Field 2A.
W75-02751

ENVIRONMENTAL ASSESSMENT: AN AID IN WATER RESOURCE MANAGEMENT,
Battelle Memorial Inst., Columbus, Ohio.
N. Dee, N. L. Drobny, K. M. Duke, J. K. Baker, and D. C. Fahringer.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 124-133. 10 ref.

Descriptors: *Environment, *Environmental effects, *Water resource management, Assessments, Water quality, Planning, Ecology, Physical properties, Chemical properties, Aesthetics, Social aspects, Water quality, Decision making, Management, Water resources development.

A framework for water resource management was discussed that identifies environmental problems and assesses the environmental consequences of alternative solutions to these problems. In this framework, emphasis was placed on performing environmental assessments in the planning process instead of the current practice of preparing them as part of an environmental impact statement. The impact statement is only a formal declaration of what occurred in the planning process, and should be used as such. (See also W75-02751) (Dawes-ISWS)
W75-02761

SOME NECESSARY CONDITIONS FOR EQUILIBRIUM AMONG MANKIND, ENVIRONMENT, AND ECONOMY,
Illinois State Environmental Protection Agency, Springfield. Div. of Water Pollution Control.
For primary bibliographic entry see Field 6B.
W75-02762

ENVIRONMENTAL CONSIDERATIONS IN WATER RESOURCES DEVELOPMENT,
Bureau of Reclamation, Denver, Colo.
H. G. Arthur.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 144-153. 4 fig, 2 ref.

Descriptors: *Water resources development, *Environmental effects, Water resources, Environment, Design standards, Hydroelectric plants, Powerplants, Tourism, Salmon, Planning, Social aspects, Aesthetics.
Identifiers: Grand Coulee Third Powerplant, Auburn Dam.

Bureau of Reclamation policies regarding, environmental protection and enhancement during design and construction phases of water related projects were described. Several examples, including the Grand Coulee Third Powerplant and Auburn Dam and Powerplant projects, were used to describe applied environmental protection policies. The importance of public input was stressed and methods of obtaining such input were discussed. Accommodation of visitors must be considered early in the design stage. (See also W75-02751) (Terstriep-ISWS)
W75-02763

NOTES ON A HISTORY OF WATERUSE,
Wisconsin Univ., Madison. Coll. of Agricultural and Life Sciences.

For primary bibliographic entry see Field 5D.
W75-02771

ENVIRONMENTAL PLANS AND IMPACTS FROM MAN MADE LAKES,
Madhya Pradesh Irrigation Dept., Raipur (India). Irrigation Mahanadi Bodhghat Hasdeo Project.
D. R. Sikka.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 243-252. 1 tab.

Descriptors: *Environmental effects, *Multiple-purpose reservoirs, *Irrigation water, *Hydroelectric power, *Economic impact, Planning, Water resources, Management, Water pollution control, Water supply, Water resource planning, Reservoir construction, Reservoir management, Flood control, Ecosystems, Human diseases, Contamination(Water).
Identifiers: *India(Raipur-Madhya Pradesh), Lake of Bhopal.

Experience with planning, construction, and management of large multipurpose river valley projects demonstrated that it has been rarely possible to derive maximum benefits from the resources invested. The major benefits are from irrigation, hydropower, and flood control. Irrigation contributed tremendously to the economic uplift of agriculturally developing areas, ushered in the 'green revolution', and initiated multiple cropping patterns. During the past 60 years, the rural population has doubled, but urban population has quadrupled and is linked with industrialization which must develop rapidly to become the backbone for economic development. Increased industrial water use, agricultural fertilizer, and pest control for irrigated agriculture affects the inflows to reservoirs. Lake Bhopal, for instance, has become a biologically active settlement tank with aspiration towards a septic tank. Basic standards of living have yet to be provided to most of the population, and creating lakes could be termed a luxury venture. A start should be made on interdisciplinary surveys and pre-investment studies to provide environmental protection in dam projects for irrigation, water supply, hydropower, fisheries, urban infrastructure, and shoreline programs. Environmental plans with concepts of total human ecosystems and total water management requiring national and international development programs should be undertaken to avoid conflicting interests. (See also W75-02751) (Dawes-ISWS)
W75-02772

IMPACT OF TRADITIONAL WATER RESOURCES TECHNOLOGY ON THE HUMAN ENVIRONMENT,
State Univ. of New York, Syracuse. Coll. of Environmental Science and Forestry.
P. E. Black.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 253-263. 60 ref.

Descriptors: *Alternative planning, *Multiple-purpose reservoirs, *Water resources development, *Water allocation(Policy), Water policy, Optimum development plans, Project purposes, Water utilization, Environment, Ecology, Dams, Water management(Applied), Technology, Non-structural alternatives.

Unwise expenditure for dams was criticized. Construction of a dam has far-reaching, irrevocable, and usually permanent consequences. Dams are said to only partially attain their purposes of flood control, irrigation, hydroelectric power, low flow augmentation, or water supply. Little new construction is necessary if other alternatives are chosen. Recycling supplies, reducing waste, treatment of waste effluents, and flood plain zoning are several possibilities. (See also W75-02751) (Jess-ISWS)
W75-02773

WATER RESOURCE DEVELOPMENT AND ENVIRONMENT: AN APPROACH TO IMPACT ANALYSIS,
Waterloo Univ. (Ontario). Dept. of Man-Environment Studies.
For primary bibliographic entry see Field 6A.
W75-02774

AN APPROACH TO ASSESSING ENVIRONMENTAL IMPACTS,
Waterloo Univ. (Ontario). Dept. of Man-Environment Studies.
D. W. Fischer, and G. S. Davies.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 270-278. 3 fig, 10 ref.

Descriptors: *Environmental effects, *Evaluation, Research and development, Analytical techniques, Planning, Environment, Evolution, Water resources development, Management, Engineering, Economics, Decision making, Comprehensive planning.

An approach to systematically evaluate environmental impact was presented. A multi-disciplinary team approach was stressed. Steps to final assessment should include: (1) an environmental baseline evaluation; (2) an environmental compatability matrix (a process of evaluating various environmental activities, processes, or elements); and (3) the decision matrix. (See also W75-02751) (Jess-ISWS)
W75-02775

WATER CONSERVATION AND POLLUTION CONTROL IN INDIA--AN ENVIRONMENTAL APPROACH,
For primary bibliographic entry see Field 4A.
W75-02789

REMOTE SENSING AS AN AID FOR MARSH MANAGEMENT,
Louisiana State Univ., Baton Rouge. Div. of Engineering Research.
For primary bibliographic entry see Field 7B.
W75-02800

INTERACTION BETWEEN FISHERY MANAGEMENT AND ENVIRONMENTAL PROTECTION,
Bedford Inst., Dartmouth (Nova Scotia). Marine Ecology Lab.
L. M. Dickie.
Journal of the Fisheries Research Board of Canada, Vol 30, No 12, Pt 2, p 2496-2506, December, 1973. 33 ref.

Descriptors: *Fish management, *Environmental control, Fisheries, Environmental engineering, Data collections, Correlation analysis, Mixing, Aquatic productivity.

Earlier attempts to demonstrate simple correlations of yield with various fishing and environmental indices were frustrated by variability in statistical data, poor definition of oceanographic and population systems, and ignorance of the responsible mechanisms. Recent research results support hypotheses that environmental fluctuations are major factors controlling year-class success. There is also evidence for strong density-dependence of survival of larval fishes, and of growth in juveniles and adults; however, in some populations effects of the recent and highest sustained rates of fishing have exceeded the 'adaptative' capacity of the production-compensating mechanisms so that the carrying capacity of the environment is now unsaturated. The main mechanism controlling fishery productivity fluctuations within areas appears to be the degree of vertical mixing in oceanographic systems, with the associated nitrogen supplies and food resources for the early life-history stages of fishes. Recent knowledge of natural variability, and its interaction with density-dependent mechanisms controlling production, implies that a new approach involving 'discontinuous' models appears necessary to prediction of ecosystem responses to fishing and pollution. (Sandoski-FIRL)
W75-02870

THE FIRST TWO YEARS--A REVIEW OF EPA'S ENFORCEMENT PROGRAM,
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 6E.
W75-02937

ENVIRONMENTAL LAW: SUMMARY OF THE FEDERAL WATER POLLUTION CONTROL ACT (AMENDMENTS OF 1972),
Datatronic Systems Corp., Panorama City, Calif.
M. P. Milane.
Available from National Technical Information Service, Springfield Va. 22161, U.S. Dept. of Commerce, as PB-225 462, $3.25 in paper copy, $2.25 in microfiche. Jan. 1973. 13 p.

Descriptors: *Federal Water Pollution Control act, *Legislation, *Federal government, *Water pollution control, *Information retrieval, Water pollution, Legal aspects, Water quality, Monitoring, Water quality control, Water quality standards, Water quality criteria, State governments, Governmental interrelations, Regulation, Water policy, Administration, Government finance, Planning, Waste treatment, Water Quality Act, Governments, Water law, Adoption of practices.
Identifiers: *FWPCA Amendments of 1972, *State policy, *Licenses, *Environmental Impact Statements.

A brief overview of the purpose and goals of the 1972 amendments to the Federal Water Pollution Control Act, and specific information relating to the following provisions of the amendments are presented. Under municipal pollution the increased federal funding available to local governments for improvement of sewage treatment facilities is summarized and the eligibility requirements for receipt of these funds and the implementation schedule for the new, more stringent waste treatment standards are outlined. Under water quality standards the manner in which the expanded water quality standards program will operate is described and the annual report on the quality of the nation's water to be made to Congress by the Environmental Protection Agency is discussed. Under permits and licenses, the new cooperative federal-state program for issuing permits for discharge into the nation's waters which replaces the 1899 Refuse Act program is summarized. Under enforcement the report outlines the new streamlined enforcement measures available to the Environmental Protection Agency, particularly the increased role of the courts. (Deckert-Florida)
W75-02956

GREAT LAKES CONNECTING CHANNELS WIDENING AND DEEPENING BENDS IN ST. MARY'S RIVER MICHIGAN, PHASE III, (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Detroit, Mich.
For primary bibliographic entry see Field 4A.
W75-02969

POCATALICO RIVER BASIN JOINT SURVEY, ROANE, JACKSON, PUTNAM, AND

KANAWHA COUNTIES, WEST VIRGINIA. INTERIM REPORT (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 4A.
W75-02970

INCREASING HEIGHT OF LEVEES ALONG RIO GRANDE UPSTREAM FROM RETAMAL DAM AND ALONG MAIN AND NORTH FLOODWAYS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
International Boundary and Water Commission, El Paso, Tex.
For primary bibliographic entry see Field 4A.
W75-02971

GILA RIVER CHANNEL IMPROVEMENTS BETWEEN CAMELSBACK RESERVOIR SITE AND SALT RIVER ARIZONA (UPPER END OF SAFFORD VALLEY BETWEEN THE BROWN CANAL, ETC....) (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Los Angeles, Calif.
For primary bibliographic entry see Field 3B.
W75-02972

DESIGN OF ENVIRONMENTAL INFORMATION SYSTEMS.
Michigan Univ., Ann Arbor. School of Public Health.
Ann Arbor Science Publishers, Inc., Ann Arbor, Michigan, 1974. R. A. Deininger, editor. 422 p. ($24.50).

Descriptors: *Environmental control, Environmental effects, *Information exchange, *Information retrieval, *Conferences, Europe, Pollution abatement, Air pollution, Water pollution, Solid wastes, International Commissions, *Design.
Identifiers: *Poland.

This volume contains the proceedings of an international seminar held at the Polish Environmental Pollution Abatement Centre in Katowice, January 11-20, 1973, which was cosponsored by the European Regional Office of the World Health Organization and the Polish Government. It was attended by the ecology experts from East and West European countries, the USA, and representatives of ECE (Economic Commission of Europe) and WMO (World Meteorological Organization). Contributions presented by different authors dealt with six major topics: General environmental information systems; information systems for air and water pollution control; systems for solid waste management; information systems in Poland; and activities of international organizations for environmental protection. All addressed themselves to the achievments and remaining problems of collecting, organizing, processing, disseminating, and coordinating environment-related information. (Brown-IPC)
W75-02992

BIOLOGICAL EFFECTS IN THE HYDROLOGICAL CYCLE,
For primary bibliographic entry see Field 2A.
W75-03023

REMOTE SENSING IN MICHIGAN FOR LAND RESOURCE MANAGEMENT: WATERFOWL HABITAT MANAGEMENT AT POINTE MOUILLEE,
Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
For primary bibliographic entry see Field 4A.
W75-03120

ECONOMIC AND ECOLOGICAL APPROACHES TO THE OPTIMAL LEVEL OF POLLUTION,
London Univ. (England). Dept. of Economics.
For primary bibliographic entry see Field 5G.
W75-03121

SCENIC RIVER STUDY OF THE LOWER ST. CROIX RIVERS.
Bureau of Outdoor Recreation, Washington, D.C.
For primary bibliographic entry see Field 6B.
W75-03141

LOUISIANA SUPERPORT STUDIES. REPORT 3. RECOMMENDATIONS FOR THE ENVIRONMENTAL PROTECTION PLAN,
Louisiana State Univ., Baton Rouge. Center for Wetlands Resources.
A. H. Stone, J. M. Robbins, D. B. Johnson, R. M. Pope, and J. G. Gosselink.
Center for Wetland Resources, Report 3, October 31, 1973. 530 p, 28 fig, 77 tab, 128 ref. LDDH/TA 168-20-F652/F653.

Descriptors: *Harbors, Coasts, Littoral, Legislation, *Environmental effects, Ecology, Pollution, Governmental regulations, *Louisiana.
Identifiers: *Seaports, *Environmental impact, *Superports, *Deepdraft harbors, *Marine terminals, Coastal zone management, Sea Grant Program, Ocean environments.

The report provides data and recommendations for use in the design of an Environmental Protection Plan in considering Louisiana superport development. Information is given on the environment, site selection, guidelines for design, construction and operation of superports and related activities. Attention is called to authority funding and compensatory projects and the legal requirements of governmental agencies. It is suggested that the major environmental stresses that may result from superport development are (1) oil or other material spills, (2) construction and operational damages, and (3) ancillary development. Though ancillary development promises many economic benefits it also poses the greatest environmental problem, i.e., what is the optimum proportion or ratio of economic growth and development to natural ecosystems or conservation. Regional planning based on preliminary estimates of this ratio, must begin now or the gradual environmental deterioration of coastal Louisiana will be a high probability. (Sinha-OEIS)
W75-03183

ENVIRONMENTAL VALUES IN DECISION MAKING: PORT JEFFERSON AS A CASE STUDY,
Grumman Ecosystems Corp., Bethpage, N.Y.
J. Wells, and D. Hill.
Environmental Sciences, Vol 17, No 4, p 19-28, July/August 1974. 1 fig, 7 tab, 4 ref.

Descriptors: *Planning, *Evaluation, *Decision making, *Environmental effects, Dredging, Environmental control, *New York.
Identifiers: Long Island(NY), Port Jefferson Harbor(NY).

The National Environmental Policy Act of 1970 has increased the inclusion of environmental values in natural resource decision making. One way of performing an environmental analysis of a certain course of action is described. Port Jefferson Harbor, Long Island, New York, is a delivery point for petroleum products. The harbor is not deep enough to accomodate modern tankers. The course of action evaluated is whether to dredge the harbor to allow the large tankers to enter. The method of analysis contains the following steps: establishment of a valid cost-effectiveness framework, with emphasis on the extent of the geographical area affected; identification of the environmental parameters that may be affected; preparation of a qualitative summary of the effects of the alternative plans on the environmental parameters by reviewing the available literature; evaluation of the nature of the environmental impacts as beneficial or detrimental, also considering countervailing effects and uncertainty; tabulation of these evaluations by alternative, geographic area, and type of impact; and, summarization and analysis of these tables to determine patterns of environmental impacts. This analysis summarized in one chart the complex, controversial subject of the environmental consequence of dredging Port Jefferson Harbor versus alternatives for delivering oil to the area. (Orr-FIRL)
W75-03225

MR. JUSTICE DOUGLAS, DISSENTING,
For primary bibliographic entry see Field 6E.
W75-03280

OIL AND PUGET SOUND,
For primary bibliographic entry see Field 5C.
W75-03281

7. RESOURCES DATA

7B. Data Acquition

THE WORLD WATER BALANCE, INTERNATIONAL HYDROLOGICAL PROGRAM (I.H.P.) ACTIVITIES, AND REMOTE SENSING APPLICATIONS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 2A.
W75-02752

SURFACE WATER POLLUTION BY DISCHARGE OF COMBINED SEWER SYSTEMS, SWISS METHOD OF CALCULATION, (IN FRENCH),
Infraconsult S.A., Bern (Switzerland).
For primary bibliographic entry see Field 5B.
W75-02785

INTERNAL SURGES IN COASTAL WATERS,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 2L.
W75-02791

DYE STUDIES THROUGH USE OF ADVANCEMENTS IN AN AERIAL OPTICAL MECHANICAL IMAGING SYSTEM,
Battelle Pacific Northwest Labs., Richland, Wash.
J. R. Eliason, and H. P. Foote.
Available from the National Technical Information Service, Springfield, Va 22161 as BNWL-SA-3204, $4.00 in paper copy, $2.25 in microfiche. BNWL-SA-3204, April 1970. 20 p, 14 fig. AEC AT(45-1)-1830.

Descriptors: *Tracking techniques, *Surface waters, *Remote sensing, *Analytical techniques, Fluorescent dye, Dye concentrations, Measurements, Tracers, Surveys, Rivers, Evaluation, Data processing, On-site investigations.
Identifiers: *Optical mechanical imaging system.

The aerial optical mechanical imaging system is an extremely sensitive and versatile tool for conducting dye tests. Surveys were conducted in which four measurement runs were made over a dye release within 13 minutes after release. Computer techniques for evaluating the data have allowed rapid analysis of the tests. Measurements of dye concentrations were collected by this system at rates (72,000 per second) which could not practically be collected by other analytical techniques. This technique will open a new area of surface

water studies which could not be quantitatively evaluated by conventional techniques. Laboratory and field tests are being conducted to obtain detailed measurements of system sensitivities to improve quantitative evaluations of the data. (Humphreys-ISWS)
W75-02792

TEMPORAL REFERENCE LINE HOLOGRAMS FROM A WATER SURFACE,
Texas Univ., Austin. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 2L.
W75-02793

REMOTE SENSING AS AN AID FOR MARSH MANAGEMENT,
Louisiana State Univ., Baton Rouge. Div. of Engineering Research.
J. G. Ragan, and J. H. Green.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-22976, $3.75 in paper copy, $2.25 in microfiche. Earth Resources Report AOP No 4, December 1973. 28 p, 12 fig, 4 tab, 7 ref.

Descriptors: *Marsh management, *Basic data collections, *Louisiana, *Habitat improvement, Marshes, Land management, Vegetation, Remote sensing, Aerial photography, On-site data collections, Soil analysis, Benthos, Fish, Zooplankton, Nekton.
Identifiers: *Terrebonne Parish(La).

The use of remote sensing techniques in monitoring and evaluating selected areas of Louisiana's coastal marshes was explored. Ground truth data collected during June, July, and August 1973 consisted of identifying vegetation at selected sites, measuring profiles of waterways and tidal flow rates, and collecting samples of nekton, benthic, and zooplankton organisms. Analyses of samples were tabulated for managed and unmanaged marshes. Infrared photographs were useful in selecting study sites, drainage patterns, spoil banks, and locating ancient levees and channels which were not obvious from the ground. There were problems in the use of color infrared photographs for sedimentological studies in marsh areas of Louisiana because the ground is covered with lush vegetation that obscures the soil and sediments. This vegetation may or may not reflect changes in the underlying sediments. (Humphreys-ISWS)
W75-02800

COLLECTION AND ANALYSIS OF REMOTELY SENSED DATA FROM THE RHODE RIVER ESTUARY WATERSHED,
Smithsonian Institution, Edgewater, Md. Chesapeake Bay Center for Environmental Studies.
For primary bibliographic entry see Field 2L.
W75-02806

HYDROLOGIC DATA FOR URBAN STUDIES IN THE HOUSTON, TEXAS METROPOLITAN AREA, 1972,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 2E.
W75-02813

THE REMOTE SENSING PROGRAM REQUIRED FOR THE AIDJEX MODEL,
Cold Regions Research and Engineering Lab., Hanover, N. H.
W. F. Weeks, M. D. Coon, and W. J. Campbell.
AIDJEX Bulletin No 27, Washington University Division of Marine Resources, p 22-44, November 1974. 1 fig, 1 tab, 18 ref.

Descriptors: *Remote sensing, *Sea ice, *Ice cover, Data collections, Arctic, Mathematical models.
Identifiers: AIDJEX, Arctic Ice Dynamics Joint Experiment.

The requirements of the AIDJEX remote sensing program for developing an improved numerical model of the drift and deformation of sea ice are discussed. This report is to serve as part of the input (which will also include the availability of sensor systems and platforms, as well as the particular research interests of the participating organizations) that is necessary to formulate an overall AIDJEX remote sensing plan. The independent determination of the ice thickness distribution by using remote sensing techniques is of paramount importance to the successful operation of the AIDJEX model and is the foremost problem that must be faced in developing an AIDJEX remote sensing program. (Knapp-USGS)
W75-02815

MESOSCALE DESCRIPTION FOR THE PRINCIPAL BERING SEA ICE EXPERIMENT,
Department of the Environment, Ottawa (Ontario).
For primary bibliographic entry see Field 2C.
W75-02823

VARIATION OF ICE MORPHOLOGY OF SELECTED MESOSCALE TEST AREAS DURING THE BERING SEA EXPERIMENT,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 2C.
W75-02824

ICE THICKNESS DISTRIBUTION AS INFERRED FROM INFRARED AND MICROWAVE REMOTE SENSING DURING THE BERING SEA EXPERIMENT,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 2C.
W75-02825

METHOD AND APPARATUS FOR MEASURING WATER CURRENTS,
H. J. White, Jr.
U. S. Patent No 3,834,229, 9 p, 9 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 926, No 2, p 403, September 10, 1974.

Descriptors: *Currents(Water), *Water measurement, *Current meters, *Flow measurement, *Instrumentation, Measurement.
Identifiers: Surface current measurement.

An instrument package containing three float markers is dropped into a body of water. The first of the markers is designed to float on the surface. The second and third markers sink to a subsurface level and then are released with a predetermined time delay, whereupon they ascend to and float on the surface. The relative positions of all three float markers are then charted, and from such chart and the elapsed times both the water current velocity at the surface and the average current velocity from the subsurface level to the surface are calculated. (Sinha-OEIS)
W75-02849

FLASH-FLOOD WARNING SYSTEMS.
For primary bibliographic entry see Field 4A.
W75-02863

WATER MONITORING THROUGH CONTINUOUS MEASUREMENT OF SEVERAL PARAMETERS (GEWAESSERUEBERWACHUNG MIT KONTINUIERLICHER MULTIPARAMETER-MESSUNG).
For primary bibliographic entry see Field 5A.
W75-02867

AUTOMATED WET CHEMICAL MICROCOULOMETRIC ANALYZER FOR CHLORIDE ION,
California Univ., Riverside. Dept. of Entomology.
For primary bibliographic entry see Field 5A.
W75-02873

STORM WATER SAMPLING MACHINE,
Greater London Council (England). Dept. of Public Health Engineering.
For primary bibliographic entry see Field 5A.
W75-02876

AN INVESTIGATION OF TURBIDITY IN ESTUARINE WATERS,
Connecticut Univ., Storrs. Inst. of Water Resources.
For primary bibliographic entry see Field 2L.
W75-02881

WATER STABILITY TESTS ON CLAY SOILS IN RELATION TO MOLE DRAINING,
Ministry of Agriculture, Fisheries and Food, Trumpington (England). Field Drainage Experiment Unit.
For primary bibliographic entry see Field 2G.
W75-02909

A NEW SHALLOW WATER MULTIPLE-PLATE SAMPLER,
Sabine River Authority of Texas, Orange.
D. S. Parsons, and J. W. Tatum.
The Progressive Fish-Culturist, Vol 36, No 3, p 179-180, July 1974. 1 fig, 4 ref.

Descriptors: *Sampling, Equipment, Technology, *Design, Benthos, Water quality control, Monitoring, Shallow water, *Water sampling, *Instrumentation, Measurement.
Identifiers: *Macroinvertebrate samplers.

An improved method for benthic macroinvertebrate sampling is possible with a newly developed multiple-plate artificial substrate. The construction and use are described. Each sampler consists of ten 3-inch diameter hardboard disks assembled on a 6-inch section of threaded steel rod. Qualitative macroinvertebrate data were successfully collected in shallow-water stream and reservoir areas. (Katz)
W75-02918

WAVE MEASURING APPARATUS,
Ministry of National Defence, Ottawa (Ontario). (assignee)
L. A. Buckler.
US Patent No 3,769,838, 10 p, 14 fig, 1 tab, 2 ref; Official Gazette of the United States Patent Office, Vol 916, No 1, p 59, November 6, 1973.

Descriptors: *Patents, *Waves(Water), *Ocean waves, *Buoys, Water resources, Instrumentation, Measurement.
Identifiers: *Wave height measurement, Sea surface.

Wave measuring apparatus for determining the wave height on the surface of the sea includes a buoy having an antenna. When the buoy is floating on the sea its motion causes electronic circuitry within it to transmit bursts of RF signals. The pulse repetition rate varies directly in proportion to the acceleration applied to the buoy as it moves up and down on the surface of the sea. Ship-borne apparatus is provided to receive the signals transmitted by the wave buoy to analyze them and to provide an indication of the height of the waves. (Sinha-OEIS)
W75-02931

DETERMINING POROSITY WITH NEUTRON LOGS FROM HAWAIIAN BASALTIC AQUIFERS,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 4B.
W75-02978

THE DEVELOPMENT OF AN AUTOMATED BIOLOGICAL MONITORING SYSTEM FOR WATER QUALITY,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology; and Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.
For primary bibliographic entry see Field 5A.
W75-02986

NEW AIDS AND METHODS FOR TEACHING HYDROLOGY,
Texas Univ., Austin. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W75-03040

THE DETERMINATION OF VOLATILE ORGANIC COMPOUNDS AT THE MICROGRAM/L LEVEL IN WATER BY GAS CHROMATOGRAPHY,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5A.
W75-03043

ION SELECTIVE MEMBRANE ELECTRODES FOR WATER POLLUTION MONITORING,
State Univ. of New York, Buffalo. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-03048

RELATIVE EFFICIENCY OF SEVERAL ATOMIZATION AND SAMPLE INTRODUCTION SYSTEMS IN ANALYTICAL ATOMIC SPECTROMETRY,
California Inst. of Tech., Pasadena. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-03060

STAGE RECORDER WITH DIRECT FLOAT-TO-PEN LINKAGE,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
L. D. Meyer, and G. R. Foster.
Transactions of the American Society of Agricultural Engineers, Vol 17, No 4, p 666-667, July-August 1974. 3 fig, 2 ref.

Descriptors: *Instrumentation, *Water level recorders, *Flow measurement, *Flumes, *Weirs, *Equipment, Water measurement, Charts, Flow, Flow rates, Gages, Discharge(Water), Stage-discharge relations, Drums, Floats, Excess water(Soils), Field crops, On-site investigations, On-site tests, On-site data collections, On-site laboratories.
Identifiers: *Stage recorder.

A water level recorder was developed that overcomes several disadvantages of recorders commonly used with small flumes and weirs. It features include direct linkage from float to pen, battery driven clock, capability for faster (2 hr) chart rotations, rectilinear stage graphs, commercially available components, and a cost similar to currently available recorders. As built, the recorder has a water level elevation range of 0.6 ft with an expected accuracy to within + or -0.002 ft. Elevation differences of about 1 ft could be measured with a taller chart drum. The performance of the recorder has been superior to recorders previously used to measure runoff from research field plots under simulated rainfall. (Sanderson-ISWS)
W75-03099

APPLICATION OF REMOTE SENSING TO STATE AND REGIONAL PROBLEMS,
Mississippi State Univ., State College. Inst. for Environmental Studies.
For primary bibliographic entry see Field 6B.
W75-03107

REMOTE SENSING REPORT, MAJOR WATERWAYS, MEMPHIS, TENNESSEE VICINITY.
National Field Investigations Center, Denver, Colo.
For primary bibliographic entry see Field 5B.
W75-03115

REMOTE SENSING IN MICHIGAN FOR LAND RESOURCE MANAGEMENT: WATERFOWL HABITAT MANAGEMENT AT POINTE MOUILLEE,
Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
For primary bibliographic entry see Field 4A.
W75-03120

APPLICATION OF CELL ANALYSIS AND SORTING TECHNIQUES TO DISEASE DETECTION (RAPID DIFFERENTIAL DIAGNOSIS OF NEWCASTLE DISEASE VIRUS),
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 5A.
W75-03126

SIMPLE DEVICE FOR AUTOMATICALLY TRANSFERRING BROTH CULTURES,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
J. R. Wilkins, and S. M. Mills.
Appl Microbiol, Vol 27, No 3, p 612, 1974, Illus.

Descriptors: *Instrumentation, *Cultures, Microorganisms, Automation, Microbiology.
Identifiers: *Broth cultures.

A simple device is described for automatically transferring (microbial) broth cultures from 1 tube to another by means of a tilting platform.--Copyright 1974, Biological Abstracts, Inc.
W75-03136

METHOD AND APPARATUS FOR MEASURING PARTICLE CONCENTRATION IN A FLUID SUSPENSION OF PARTICLES,
W. R. Hogg, and M. D. Longman.
Canadian Patent 952,193. Issued July 30, 1974. Patent Office Record, Vol 102, No 31, p 78, July, 1974.

Descriptors: *Patents, *Suspension, Fluid mechanics, Sediment load, Suspended load, *Suspended solids, *Analytical techniques, Equipment, Water quality control, Current meters, Direct currents, Pollutant identification.

Particle concentration in a fluid suspension is measured by the generation of a signal each time a particle traverses a sensing zone; the duration of the signal or particle pulse is related to the time occupied by the particle in suspension while traversing the sensing zone. Concentration is proportional to the percentage of time the particles are in the sensing zone to the total time it takes the suspension to pass through the sensing zone. The apparatus includes electrical circuits for measuring the duration of a predetermined portion of each particle pulse between two points. The direct current component of these duration-measuring pulses averaged over the time during which they occurred is proportional to the concentration and can be found with a d.c. meter. The meter can be calibrated in terms of particle concentration. (Orr-FIRL)
W75-03204

COMBINING GEOELECTRICAL AND DRILL HOLE INVESTIGATIONS FOR DETECTING FRESH WATER AQUIFERS IN NORTHWESTERN MISSOURI,
Missouri Univ., Rolla.
For primary bibliographic entry see Field 4B.
W75-03234

DISTRIBUTION OF PRECIPITATION IN MOUNTAINOUS AREAS, VOLUME II,
For primary bibliographic entry see Field 2B.
W75-03236

A CONTRIBUTION TO THE PROBLEM OF PRECIPITATION MEASUREMENTS IN MOUNTAINOUS AREAS,
Hydrometeorological Inst. of Croatia, Zagreb, (Yugoslavia).
For primary bibliographic entry see Field 2B.
W75-03237

WINTER PRECIPITATION GAGE CATCH IN WINDY MOUNTAINOUS AREAS,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 2B.
W75-03238

THE EFFECT OF WIND ON THE RAINFALL CATCH,
Water Research Association, Marlow (England).
For primary bibliographic entry see Field 2B.
W75-03239

THE DEE WEATHER RADAR PROJECT,
British Meteorological Office, Bracknell (England).
For primary bibliographic entry see Field 2B.
W75-03240

AN OPTOGRAPHIC TECHNIQUE FOR EVALUATING THE EXPOSURE OF PRECIPITATION GAGE SITES IN MOUNTAINOUS AREAS,
West Virginia Univ., Morgantown. Div. of Forestry.
R. Lee.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No 326 (2 Vol), Geneva, Switzerland, p 62-72, 1973. 4 fig, 1 tab, 3 ref.

Descriptors: *Precipitation(Atmospheric), *Rain gages, *Photography, Topography, Wind, *West Virginia, Precipitation gages, Mountains, Sites, Distribution patterns.
Identifiers: Exposure, Stereographic projection, Globoscope.

A routine objective method of recording and evaluating the geometric exposure of precipitation gage sites was developed. The method employs a unique photographic device to obtain projections of site geometry from a paraboloidal mirror. In practice the device is mounted on the orifice of a precipitation gage, and is levelled and oriented with respect to fixed compass points on the instrument. The photographs are accurate stereographic projections of the hemisphere above the site, and include the field of view to about 12 degrees below the horizon. Vertical and horizontal angles used to describe site geometry are read directly from enlarged photographs, or from the projection of transparencies on an accessory grid system. The usefulness of the optographic method in relating the exposure of precipitation gage sites to precipitation measurement errors, and to the representativeness of watershed precipitation samples, is being tested in a network of about 100 stations in mountainous West Virginia. (See also W75-03236) (Jones-ISWS)

W75-03241

STUDIES WITH DISCONTINUOUS CULTURES AND THEIR APPLICABILITY IN WATER PROGNOSIS, (IN GERMAN),
Zentralinstitut fuer Molekularbiologie, Berlin (East Germany); and Zentralinstitut fuer Mikrobiologie und Experimentelle Therapie, Jena (East Germany).
For primary bibliographic entry see Field 2I.
W75-03247

INTERFERENCE-FREE TRACE ELEMENT ANALYSIS OF WATER, BIOLOGICAL SPECIMENS AND FOOD SOURCES BY MEANS OF NUCLEAR TECHNIQUES,
Aktiebolaget Atomenergi, Studsvik (Sweden).
For primary bibliographic entry see Field 5A.
W75-03283

STUDIES ON MOISTURE STATUS OF FOREST SOILS: A PROPOSITION OF A CERAMIC BLOCK APPARATUS FOR LONG-TERM SOIL MOISTURE MEASUREMENT IN THE FIELD AND SOME RESULTS, (IN JAPANESE),
Government Forest Experiment Station, Kansai (Japan). Lab. for Soil Science.
For primary bibliographic entry see Field 2G.
W75-03285

COMPARISON OF THE RESULTS OF BACTERIOLOGICAL WATER INVESTIGATIONS, (IN SWEDISH),
Laboratoriet Goteborgs Vatten-Avloppsverk, Goteborg (Sweden).
For primary bibliographic entry see Field 5A.
W75-03292

SCHOLANDER PRESSURE BOMB TECHNIQUE TO ASSESS THE RELATIVE LEAF WATER STRESS OF 'ORLANDO' TANGELO SCION AS INFLUENCED BY VARIOUS CITRUS ROOTSTOCKS,
Florida Univ., Gainesville. Dept. of Fruit Crops.
For primary bibliographic entry see Field 2D.
W75-03295

A TURBULENT TUBULAR ELECTRODE,
Wisconsin Univ., Madison. Dept. of Chemistry.
For primary bibliographic entry see Field 2K.
W75-03300

7C. Evaluation, Processing and Publication

THE DESIGN AND APPLICATION OF A MANAGEMENT INFORMATION SYSTEM FOR DRINKING WATER QUALITY DATA,
Philadelphia Water Dept., Pa.
For primary bibliographic entry see Field 5A.
W75-02776

GROUND-WATER-QUALITY MONITORING SYSTEMS,
ENWATS, Cambridge, Mass.
For primary bibliographic entry see Field 5A.
W75-02787

HYDROLOGIC DATA BANK USERS GUIDE,
Nevada Univ., Reno. Desert Research Inst.
C. D. Lakeotes, and H. N. Friesen.
Available from the National Technical Information Service, Springfield, Va 22161 as NVO-12535, $4.00 in paper copy, $2.25 in microfiche. User Information Bulletin 4, January 1974. 19 p, 2 append. AEC AT(29-2)-1253.

Descriptors: *Hydrologic data, *Data storage and retrieval, *Data collections, *Computer programs, Data processing, Water quality, Well data, Wells, Springs, Groundwater, Drawdown, Pumping, Aquifers, Alaska, Colorado, Nevada.

The AEC/NV Hydrologic Data Storage and Retrieval System is composed of data files and computer programs for manipulation of these files. The system is available to all users of the AEC/NV Central Computer. The names assigned to data files were presented and the file contents and documents procedures for retrieving desired data were outlined. The output of a retrieval operation consists of tabular sets of print-outs as specified by one or more retrieval data sets. (Humphreys-ISWS)
W75-02796

WATER-RESOURCES DATA COLLECTED IN THE DEVILS HOLE AREA, NEVADA, 1972-1973,
Geological Survey, Las Vegas, Nev.
J. D. Larson.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 041, $3.25 in paper copy, $2.25 in microfiche. Water-Resources Investigations 61-73, May 1974. 14 p, 8 fig, 1 tab.

Descriptors: Water resources, *Groundwater, *Water level fluctuations, *Springs, *Irrigation, Irrigation effects, Surface-groundwater relationships, Irrigation water, Irrigation wells, Observation wells, *Nevada, Pumping, Withdrawal, Discharge(Water), Groundwater movement, Spring waters, Water holes.
Identifiers: *Devils Hole(Nev), Ash Meadows, Amargosa Desert, Desert pupfish, Cyprinodon diabolis.

Data collected from July 1972 to June 1973 were used to observe the effects of groundwater withdrawals for irrigation on the water level in Devils Hole and the flow from the major springs in the Ash Meadows area. The pool in Devils Hole is a collapsed fault structure. Continuous recorders were used to monitor water levels in Devils Hole and three observation wells, and the flow from 5 springs. Power consumption at 6 irrigation wells was also collected to permit estimation of the amount of water pumped. All data were summarized in tables and graphs. (Sanderson-ISWS)
W75-02797

A MULTILAYER HYDRODYNAMICAL-NUMERICAL MODEL (W. HANSEN TYPE): MODEL DESCRIPTION AND OPERATING/RUNNING INSTRUCTIONS. PART II,
Environmental Prediction Research Facility (Navy), Monterey, Calif.
For primary bibliographic entry see Field 2L.
W75-02798

STATISTICAL SUMMARY OF AIR-QUALITY DATA FOR METROPOLITAN CLEVELAND, OHIO, 1967-1972: TOTAL SUSPENDED PARTICULATES, NITROGEN DIOXIDE, AND SULFUR DIOXIDE,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 5A.
W75-02809

FLOOD OF OCTOBER 1973 IN ENID AND VICINITY, NORTH-CENTRAL OKLAHOMA,
Geological Survey, Oklahoma City, Okla.
R. H. Bingham, D. L. Bergman, and W. O. Thomas, Jr.
Water-Resources Investigations 27-74, October 1974. 2 sheets, 12 fig, 2 map, 2 tab, 5 ref.

Descriptors: *Floods, *Oklahoma, Historic floods, Rainfall-runoff relationships, Stage-discharge relations, Flood frequency, Flood recurrence interval.
Identifiers: *Enid(Okla).

Heavy and intense rainfall of October 10 and 11, 1973 caused widespread flooding along many streams in north-central Oklahoma. This report shows the distribution and amounts of rainfall, and the magnitude and frequency of flood discharges at several sites in the area and the extent of flooding in the Enid area. Major streams within the area are the Salt Fork Arkansas, Cimarron, Arkansas, and Chikaskia Rivers. The Cimarron and Salt Fork Arkansas Rivers are major tributaries to the Arkansas River, and the Chikaskia River is a major tributary to Salt Fork Arkansas River. The data provide a basis for formulating effective floodplain zoning that could minimize existing and future flood problems. Runoff from the storm resulted in record-breaking floods on many streams in north-central Oklahoma. Several long-time residents in areas where flooding was most severe reported that stream stages during the October 1973 flood were higher than any previous stages since at least 1889. The long-term gaging stations on Turkey Creek near Drummond and Salt Fork Arkansas River near Tonkawa reached all-time maximum stages and discharges. (Knapp-USGS)
W75-02810

SELECTED HYDROLOGIC DATA, SAGEHEN CREEK BASIN NEAR TRUCKEE, CALIFORNIA, 1954-72,
Geological Survey, Menlo Park, Calif.
R. G. Simpson.
Water-Resources Investigations 55-73, April 1974. 50 p, 9 fig, 13 tab, 5 ref.

Descriptors: *Hydrologic data, *Surface waters, *Streamflow, *Sediment load, *California, Runoff, Water quality, Sediment load, Suspended load, Erosion, Water yield, Peak discharge, Low flow.
Identifiers: Sagehen Creek Basin(Calif), Sierra County(Calif), Nevada County(Calif).

Sagehen Creek in Tahoe National Forest near Truckee, Calif., drains a near-virgin environment. Since December 1953 the average discharge of Sagehen Creek has been 12.4 cubic feet per second, the annual peak flows range from 27 to 765 cubic feet per second, and minimum daily flows occur in autumn and are generally about 2.0 cubic feet per second. Mean water temperature is about 2 deg C in the winter and 13 deg C in the summer. Sediment concentration during 1968-72 has ranged from 1 to 26 milligrams per liter. Conductivity measurements ranged from 40 to 140 micromhos. Results of coliform bacteria counts and chemical analyses of water samples and surveys of plant and animal life have indicated no pollution. Little or no scour or fill has occurred, and no changes in channel alinement have been noted. (Knapp-USGS)
W75-02811

DIGITIZATION AND COMPUTERIZATION OF RIVER SYSTEM COORDINATE GEOMETRY,
Arizona Univ., Tucson. Dept. of Watershed Management.
M. M. Fogel, C. B. Cluff, G. S. Lehman, and W. O. Rasmussen.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-238 308, $3.25 in paper copy, $2.25 in microfiche. Completion Report, August 1974. 7 p. OWRT A-047-ARIZ(1). 14-31-0001-4003.

Descriptors: *Information retrieval, *Data storage and retrieval, Maps, *Mapping, *Computer programs, River systems, Land use, Data collections.

Several information retrieval systems using stream geometry as the main reference entity were examined. Different methods of annotating maps for

use with various computer programs were analyzed. A system of annotation was developed which was later modified to fit that used by the Environmental Protection Agency's program called AUTOMAP. This program was all the features deemed necessary for capture of river system parameters, land use adjacent to the stream, bridge crossings, gauging stations and, ancillary data. The retrieval portion of the program is by river mile index, latitude and longitude, or the name of the entity of interest. Six contiguous 7-1/2 minute orthophoto maps of the Tucson area have been annotated in this form. The utilization of AUTOMAP will save much time and money in not entering into a duplication of effort by producing a system similar to a small scale version of it. State and local government agencies have expressed much interest in an information retrieval system of this nature.
W75-02880

PROCEDURES FOR DETERMINING THE ORDER OF DEPENDENCE IN STREAMFLOW RECORDS,
Arizona Univ., Tucson. Dept. of Mathematics.
For primary bibliographic entry see Field 4A.
W75-02903

DETERMINING POROSITY WITH NEUTRON LOGS FROM HAWAIIAN BASALTIC AQUIFERS,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 4B.
W75-02978

A PRELIMINARY INPUT-OUTPUT WATER PLANNING MODEL FOR HAWAII,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 6A.
W75-02979

CULVERT OUTLET PROTECTION DESIGN: COMPUTER PROGRAM DOCUMENTATION,
Wyoming State Highway Dept., Cheyenne.
For primary bibliographic entry see Field 8B.
W75-03116

REVIEW OF THE RESULTS FROM THE EASTERN ATLANTIC CONTINENTAL MARGIN PROGRAM OF THE INTERNATIONAL DECADE OF OCEAN EXPLORATION,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 2L.
W75-03139

DEPTH TO BEDROCK IN WISCONSIN,
Geological Survey, Madison, Wis.
L. C. Trotta, and R. D. Cotter.
Wisconsin Geological and Natural History Survey Map, 1973. 1 sheet, 1 map.

Descriptors: *Bedrock, *Wisconsin, *Maps, *Geologic mapping, Subsurface mapping.

Depth to bedrock in Wisconsin is shown by a map scaled 1:1,000,000. The depths are given by contours and shading. (Knapp-USGS)
W75-03156

FLOOD-VOLUME DATA FOR IOWA STREAMS,
Geological Survey, Iowa City, Iowa.
O. G. Lara.
Iowa Natural Resources Council, Des Moines, Bulletin No 14, September 1974. 48 p, 2 tab.

Descriptors: *Floods, *Iowa, *Stage-discharge relations, Peak discharge, Statistics, Data collections, Hydrologic data, Streamflow, Flood frequency, Flood recurrence interval.

This report presents statistical data of flood volumes for 97 recording gaging stations in Iowa. Data include the magnitude and frequency of occurrence of maximum annual average flows, and the corresponding volumes, for selected periods ranging from 1 to 183 consecutive days. The elevation of the water surface corresponding to the listed discharges is also included. (Knapp-USGS)
W75-03162

HYDROLOGIC AND GEOPHYSICAL DATA FROM THE PICEANCE BASIN, COLORADO,
Geological Survey, Denver, Colo.
J. B. Weeks, and F. A. Welder.
Colorado Dept. of Natural Resources, Denver, Colorado Water Resources Basic-Data Release No 35, 1974. 121 p, 21 fig, 5 plate, 70 tab.

Descriptors: *Basic data collections, *Oil fields, *Water resources, *Colorado, Hydrologic data, Water wells, Springs, Water quality, Streamflow, Water resources development, Groundwater.
Identifiers: *Piceance Basin(Colo).

Potential oil-shale development and the need for information on the water resources of the Piceance basin, Colorado, led to a cooperative project between the Colorado Department of Natural Resources and the U.S. Geological Survey to provide the data needed to evaluate the effects of future development on the hydrology of the Piceance basin. Data are from 97 wells, 6 springs, and 37 continuing surface-water stations. Miscellaneous measurements of discharge and specific conductance in streams are also given. Included in this report are groundwater and surface-water data collected by the U.S. Geological Survey in cooperation with private companies. Some of the data were collected in cooperation with the U.S. Atomic Energy Commission, the U.S. Bureau of Mines, the U.S. Bureau of Land Management, the Colorado River Water Conservation District, and the Colorado Water Conservation Board. (Knapp-USGS)
W75-03165

HYDROLOGIC UNIT MAP--1974, STATE OF MAINE.
Geological Survey, Reston, Va.
Available from USGS, National Center, 12201 Sunrise Valley Dr Reston, Va 22092, $1.00. Hydrologic Unit Map of the State of Maine, 1974. 1 sheet, 1 map.

Descriptors: *Maps, *Hydrology, *Maine, Water resources, Data collections, Planning.
Identifiers: *Hydrologic unit maps.

This map and accompanying table show Hydrologic Units in Maine that are basically hydrographic in nature. The Cataloging Units shown will supplant the Cataloging Units previously used by the U.S. Geological Survey in its Catalog of Information on Water Data (1966-72). The Regions, Subregions and Accounting Units are aggregates of the Cataloging Units. The Regions and Subregions are currently (1974) used by the U.S. Water Resources Council for a comprehensive planning, including the National Assessment, and as a standard geographical framework for more detailed water and related land-resources planning. The Accounting Units are those currently (1974) in use by the U.S. Geological Survey for managing the National Water Data Network. (Knapp-USGS)
W75-03166

HYDROLOGIC UNIT MAP--1974, STATE OF NEW JERSEY.
Geological Survey, Reston, Va.
Available from USGS, National Center, 12201 Sunrise Valley Dr Reston, Va 22092, $1.00. Hydrologic Univ Map of the State of New Jersey, 1974. 1 sheet, 1 map.

Descriptors: *Maps, *Hydrology, *New Jersey, Water resources, Data collections, Planning.
Identifiers: *Hydrologic unit maps.

This map and accompanying table show Hydrologic Units in New Jersey that are basically hydrographic in nature. The Cataloging Units shown will supplant the Cataloging Units previously used by the U.S. Geological Survey in its Catalog of Information on Water Data (1966-72). The Regions, Subregions and Accounting Units are aggregates of the Cataloging Units. The Regions and Subregions are currently (1974) used by the U.S. Water Resources Council for comprehensive planning, including the National Assessment, as a standard geographical framework for more detailed water and related land-resources planning. The Accounting Units are those currently (1974) in use by the U.S. Geological Survey for managing the National Water Data Network. (Knapp-USGS)
W75-03167

HYDROLOGIC UNIT MAP--1974, STATES OF MARYLAND AND DELAWARE.
Geological Survey, Reston, Va.
Available from USGS, National Center, 12201 Sunrise Valley Dr Reston, Va 22092, $1.00. Hydrologic Unit Map of the States of Maryland and Delaware, 1974. 1 sheet, 1 map.

Descriptors: *Maps, *Hydrology, *Maryland, *Delaware, Water resources, Data collections, Planning.
Identifiers: *Hydrologic unit maps.

This map and accompanying table show Hydrologic Units in Maryland and Delaware that are basically hydrographic in nature. The Cataloging Units shown will supplant the Cataloging Units previously used by the U.S. Geological Survey in its Catalog of Information on Water Data (1966-72). Each county or county equivalent is identified by a 2-character State code and a 3-character county code. The Regions, Subregions and Accounting Units are aggregates of the Cataloging Units. The Regions and Subregions are currently (1974) used by the U.S. Water Resources Council for comprehensive planning, including the National Assessment, and as a standard geographical framework for more detailed water and related land-resources planning. The Accounting Units are those currently (1974) in use by the U.S. Geological Survey for managing the National Water Data Network. (Knapp-USGS)
W75-03168

HYDROLOGIC UNIT MAP--1974, STATES OF MASSACHUSETTS, RHODE ISLAND AND CONNECTICUT.
Geological Survey, Reston, Va.
Available from USGS, National Center, 12201 Sunrise Valley Dr Reston, Va 22092, $1.00. Hydrologic Unit Map of the States of Massachusetts, Rhode Island and Connecticut, 1974. 1 sheet, 1 map.

Descriptors: *Maps, Hydrology, *Massachusetts, *Rhode Island, *Connecticut, Water resources, Data collections, Planning.
Identifiers: *Hydrologic unit maps.

This map and accompanying table show Hydrologic Units in Massachusetts, Rhode Island, and Connecticut that are basically hydrographic in nature. The Cataloging Units shown will supplant the Cataloging Units previously used by the U.S. Geological Survey in its Catalog of Information on Water Water Data (1966-72). The Regions, Subregions and Accounting Units are aggregates of the Cataloging Units. The Regions and Subregions are currently (1974) used by the U.S. Water Resources Council for comprehensive planning, including the National Assessment, and as a standard geographical framework for more detailed water and related land-resources planning. The Accounting Units are those currently (1974) in use by the U.S. Geological Survey for managing the National Water Data Network. (Knapp-USGS)
W75-03169

HYDROLOGIC UNIT MAP--1974, STATES OF NEW HAMPSHIRE AND VERMONT.
Geological Survey, Reston, Va.
Available from USGS, National Center, 12201 Sunrise Valley Dr Reston, Va 22092, $1.00. Hydrologic Unit Map of the States of New Hampshire and Vermont, 1974. 1 sheet, 1 map.

Descriptors: *Maps, *Hydrology, *New Hampshire, *Vermont, Water resources, Data collections, Planning.
Identifiers: *Hydrologic unit maps.

This map and accompanying table show Hydrologic Units in New Hampshire and Vermont that are basically hydrographic in nature. The Cataloging Units shown will supplant the Cataloging Units previously used by the U.S. Geological Survey in its Catalog of Information on Water Data (1966-72). The Regions, Subregions and Accounting Units are aggregates of the Cataloging Units. The Regions and Subregions are currently (1974) used by the U.S. Water Resources Council for comprehensive planning, including the National Assessment, and as a standard geographical framework for more detailed water and related land-resources planning. The Accounting Units are those currently (1974) in use by the U.S. Geological Survey for managing the National Water Data Network. (Knapp-USGS)
W75-03170

HYDROGRAPHIC OBSERVATIONS FROM A NATURAL MARSH AND A MARSH ALTERED BY DREDGING, BULKHEADING, AND FILLING IN WEST BAY, TEXAS,
Corps of Engineers, Galveston, Tex.
For primary bibliographic entry see Field 5A.
W75-03175

APPLIED MATHEMATICAL MODELING OF THE OXYGEN DISTRIBUTION IN A MISSISSIPPI STREAM,
Mississippi State Univ., State College.
For primary bibliographic entry see Field 5B.
W75-03184

EXPERIMENTAL SIMULATION OF STOCHASTIC STREAM RESPONSE TO THERMAL INPUTS AND APPLICATION OF SPECTRAL ANALYSIS TECHNIQUES,
Kansas State Univ., Manhattan. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W75-03296

DAM: A COMPUTER IMPLEMENTED WATER RESOURCE TEACHING GAME,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Fisheries and Wildlife Sciences.
For primary bibliographic entry see Field 6B.
W75-03297

8. ENGINEERING WORKS

8A. Structures

COLLAPSIBLE DAM AND DAMMING METHOD,
Imbertson (N.M.) and Associates, Inc., Burbank, Calif. (assignee)
L. E. Tabor.
U. S. Patent No 3,834,167. 4 p, 3 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 926, No 2, p 386, September 10, 1974.

Descriptors: *Patents, *Dams, *Flow control, *Water control, Impoundments, Dam design, Structures.
Identifiers: Collapsible dams.

An inflatable envelope type collapsible dam is made up of a plurality of inflatable envelopes one inside the other. The dam is mounted across a watercourse with the upstream edges of each of the inflatable envelopes anchored at substantially the same location in the watercourse. The pressures inside of the envelopes are selectively set so that each inner envelope supports a predetermined portion of the water pressure against the outer envelope or envelopes. Thereby, the dam may be built to an increased height since a portion of the pressure on the material making up the dam outer envelope is supported by the one or more inner envelopes of the dam. (Sinha-OEIS)
W75-02852

NEW SEWER OUTFALL WILL SPAN THREE BRIDGES.
For primary bibliographic entry see Field 5D.
W75-02858

FRESH WATER SEAL IN RIVER SLUICE.
New Civil Engineer, No 78, p 32-33, February 7, 1974. 2 fig.

Descriptors: *Tides, *Drainage systems, *Outlets, *Sluices, Roller gates, Engineering structures, Reservoirs, Freshwater, Silts, Salts, Sluice gages, Water level, Rivers.
Identifiers: *River Axe(England), England.

A unique system of water control machinery is now in operation at Brean Cross Sluice on the River Axe near Burnham-on-Sea. It is the latest in a series of major tidal outfalls constructed for the Somerset River Authority. Two major sluice openings are provided, each with a tidal flap and a double sealing vertical lift roller gate. The structure was designed to accomodate a further identical gate in each opening to form a well between the two gates. Under normal conditions the gates are lifted and discharge is controlled by the tidal flaps, but during the summer months all gates would be lowered and the well between the gages pumped full of fresh water from upstream using a submersible pump and maintaining the water level in the well above the tide level. This system excludes salt and silt from the fresh water reservoir upstream. (Merritt-FIRL)
W75-02861

GREAT LAKES CONNECTING CHANNELS WIDENING AND DEEPENING BENDS IN ST. MARY'S RIVER MICHIGAN, PHASE III, (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Detroit, Mich.
For primary bibliographic entry see Field 4A.
W75-02969

POCATALICO RIVER BASIN JOINT SURVEY, ROANE, JACKSON, PUTNAM, AND KANAWHA COUNTIES, WEST VIRGINIA. INTERIM REPORT (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 4A.
W75-02970

DETERMINATION OF THE RAIN RUNOFF WITH SPECIAL REGARD TO THE RUNOFF FROM INDIVIDUAL PLOTS. PART 2: APPLICATION OF ASSUMED RAIN DURATION TO SMALL AREAS--METHOD OF SUMMATION OF RUNOFF LINES--STORAGE CAPACITY IN MIXED RAINWATER SEWERS, (IN GERMAN),
For primary bibliographic entry see Field 2A.
W75-02998

SAN LUIS UNIT TECHNICAL RECORD OF DESIGN AND CONSTRUCTION: VOLUME IV. DESIGN, DOS AMIGOS PUMPING PLANT, PLEASANT VALLEY PUMPING PLANT,
Bureau of Reclamation, Denver, Colo.
For primary bibliographic entry see Field 8C.
W75-03005

HYDRAULIC MODEL STUDIES OF CRYSTAL DAM SPILLWAY AND OUTLET WORKS, COLORADO RIVER STORAGE PROJECT,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
For primary bibliographic entry see Field 8B.
W75-03110

CULVERT OUTLET PROTECTION DESIGN: COMPUTER PROGRAM DOCUMENTATION,
Wyoming State Highway Dept., Cheyenne.
For primary bibliographic entry see Field 8B.
W75-03116

THE ROLE OF MODELING IN ENGINEERING DESIGN,
Gilbert Associates, Inc., Reading, Pa.
For primary bibliographic entry see Field 5D.
W75-03224

8B. Hydraulics

THE RHINE-MAIN-DANUBE CONNECTION--A WATERWAY FOR EUROPE,
Rhein-Main-Donau A.G., Munich (West Germany). Managing Board.
For primary bibliographic entry see Field 4A.
W75-02778

LABORATORY STUDIES OF THE HYDRAULIC PERFORMANCE OF ONE-STORY AND SPLIT-LEVEL RESIDENTIAL PLUMBING SYSTEMS WITH REDUCED-SIZE VENTS,
National Bureau of Standards, Washington, D.C. Center for Building Technology.
R. S. Wyly, G. C. Sherlin, and R. W. Beausoliel.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 Price $0.95. Building Science Series 49, March 1974. 46 p, 34 fig, 12 tab, 18 ref, 1 append.

Descriptors: *Laboratory tests, *Plumbing, Testing, *Sanitary engineering, *Domestic wastes, Hydraulics, Testing procedures, Evaluation, Drains, Performance.
Identifiers: Plumbing vents, Reduced size vents, Drain-waste-vent systems, One-story residence, Split-level residence.

A laboratory study of one-story and split-level experimental drainage systems where the vents in some cases were varied from one to six pipe-sizes smaller than those presently specified by codes showed satisfactory hydraulic and pneumatic performance under various loading conditions. Recommended criteria for the design and evaluation of systems with reduced-sized vents and a sizing table for one- and two-story systems were presented. The laboratory work also contributed to the development of analytical and test procedures needed for evaluating the application of reduced-size venting to a broad range of innovative drain-waste-vent designs for buildings of any height. This work indicates that, in some circumstances, reduced-size venting might be a good alternative to other types of drainage systems for multi-story buildings that use either conventional or innovative venting concepts. Because this study involved only a limited number of drainage system designs, it is recommended that ongoing field and laboratory studies be explored if code changes are contemplated to permit the use of smaller vents. (Humphreys-ISWS)
W75-02790

CONTROL OF EROSION,
Tup (Panama) S.A., Panama City. (assignee)
E. S. Tupper.
U. S. Patent No 3,844,124, 3 p, 6 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 927, No 5, p 1838, October 29, 1974.

Descriptors: *Patents, *Erosion control, *Beach erosion, *Shore protection, Equipment, Waves(Water), Conservation, Recreation, Reclamation, Resources.
Identifiers: *Wave action.

A length of mechanically strong material of cross-shaped cross-section, when placed along a beach, is resistant to tipping on wave-impact and prevents or hinders erosion. It can be made of concrete, in the shape of a cross of four equal arm lengths, either integrally or as interlocking slotted slabs. These slabs can also be built up into a chain of indefinite length, thus preventing gaps between individual members. One or more of such structures can be provided on the beach above or below low water mark and as individual units or in the form of a chain or of parallel chains. If desired the underlying units can be dug up at, for example, the end of a winter season to leave a flat beach for the summer period, but in practice they will usually become covered by sand and present an acceptable appearance if left in place year round. (Sinha-OEIS)
W75-02845

RELATIONSHIP BETWEEN DIAMETER AND HEIGHT FOR THE DESIGN OF A SWIRL CONCENTRATOR AS A COMBINED SEWER OVERFLOW REGULATOR,
American Public Works Association, Chicago, Ill.
For primary bibliographic entry see Field 5D.
W75-03022

TEMPERATURE EFFECTS IN FLOWS OVER NONPLANAR BEDS,
Civil Engineering Lab. (Navy), Port Hueneme, Calif.
B. D. Taylor.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY12, Proceedings Paper 11015, p 1785-1807, December 1974. 10 fig, 4 tab, 18 ref, 2 append. NSF Grant No GK-3910.

Descriptors: *Streambeds, *Water temperature, *Hydraulics, *Channel morphology, *Roughness(Hydraulic), Movement, Open channel flow, Flow, Sedimentation, Dunes, Ripple marks, Streams, Reynolds number, Bed load, Beds.
Identifiers: Trigonal lattices, Grain-roughness boundary Reynolds number.

Laboratory results showed that in flows over ripple and dune beds a 15C to 20C increase in water temperature can effect significant changes in bed-load discharge, bed form, and roughness. These results were correlated with data from natural streams. The analysis indicates that temperature related changes in a stream at constant discharge are primarily a function of grain-roughness boundary Reynolds number. In flows in which grain-roughness boundary Reynolds number is less than a value near 10, an increase in water temperature effects an increase in bed-load discharge and an early (lower-velocity) transition from ripples to dunes. Whereas 10 is less than grain-roughness boundary Reynolds number is less than 20 which is obtained in several American rivers, the temperature effect on bed-load discharge depends on the distribution of bed sediment sizes due to a qualitative change in temperature effect on bed-load discharge that takes place in this range and bed form transitions, e.g., dunes to flat bed, occur at lower velocities with cold water. (Jess-ISWS)
W75-03088

JET-FORCED CIRCULATION IN WATER-SUPPLY RESERVOIRS,
Karlsruhe Univ. (Germany).
For primary bibliographic entry see Field 5B.
W75-03095

HYDROLOGY OF POROUS PAVEMENT PARKING LOTS,
Maryland Univ., College Park. Dept. of Civil Engineering.
T. J. Jackson, and R. M. Ragan.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY12, Proceedings Paper 11010, p 1739-1752, December 1974. 8 fig, 2 tab, 16 ref, 2 append.

Descriptors: *Urban drainage, *Asphaltic concrete, *Storm drains, *Subsurface drainage, Urban runoff, Urban hydrology, Porous media, Paving, Storm runoff, Storm water, Hydraulics, Hydrology, Subsurface drains, Mathematical models, Hydrograph analysis, Water management(Applied).
Identifiers: Boussinesq equation.

Numerical solutions of the Boussinesq equation were used to examine the hydrologic behavior of porous pavement systems incorporating subdrains in open graded base courses placed on impermeable membranes. A series of numerical experiments showed that substantial control of the runoff hydrograph from parking lots could be obtained through the use of porous pavements. The numerical experiments conducted with synthetic design storms were used to develop equations and graphs for use by engineers designing porous pavement systems for runoff control. (Terstriep-ISWS)
W75-03098

PERMEABILITY OF COHESIONLESS SOILS,
Libya Univ., Tripoli. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2G.
W75-03101

TESTS OF SCOUR PROTECTION FOR BRIDGE PIERS,
Connecticut Univ., Storrs. Dept. of Civil Engineering.
C. J. Posey.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY12, Proceedings Paper 11017, p 1773-1783, December 1974. 8 fig, 1 tab, 11 ref, 2 append.

Descriptors: *Bridges, *Piers, *Scour, *Bed load, Floods, Alluvial channels, Cross-sections, Degradation(Stream), Erosion, Riprap, Particle size, *Erosion control, Hydraulics.
Identifiers: Inverted filter protection, Terzaghi-Vicksburg specifications.

If flood velocities concentrated by the area constriction at bridges remove material from under the bridge pier foundations, the pier may settle or collapse. The maximum depth of scour occurring during the passage of a flood peak is difficult to ascertain or to estimate by empirical formulas or model tests. To explore further the method of limiting the depth of scour by surrounding the pier with protective material, model tests were made covering a range of constriction percentages, depths of flow, and Froude numbers, using both round and elongated piers. After determining the extent of the scour hole formed during the passage of simulated flood, the protection afforded by a layer of protective material was tested with a repetition of the same flood. If the material of the layer was large enough to resist being moved and had a grain-size distribution capable of preventing leaching, no scour hole was formed. A special test showed protection remaining intact despite stream bed degradation. (Singh-ISWS)
W75-03105

ON THE THEORY OF WATER WAVES,
California Univ., Berkeley. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 2E.
W75-03108

HYDRAULIC MODEL STUDIES OF CRYSTAL DAM SPILLWAY AND OUTLET WORKS, COLORADO RIVER STORAGE PROJECT,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
P. H. Burgi, and S. Fujimoto.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-233 844, $3.75 in paper copy, $2.25 in microfiche. Report No REC-ERC-73-22, December 1973. 24 p, 30 fig.

Descriptors: *Hydraulic models, *Outlet works, *Spillways, *Discharge coefficient, Vortices, Hydraulics, Cavitation, Piers, Riprap, Head loss, Model studies, Gates, *Colorado, *Colorado River Basin, Submergence, Flow, Orifices.
Identifiers: Crystal Dam(Colo), Plunge basins, Flip buckets, Bellmouths, Jet-flow gates.

Hydraulic model studies were made to determine the flow characteristics of the Crystal Dam spillway, plunge pool, and outlet works. The initial flop bucket spillway was tested, and the bucket exit modified by extending the 15-foot radius beyond the bucket invert to a 4:1 tangent at the bucket lip. The modified bucket was required to adequately flop the spillway jet into the plunge pool. A 15-foot high deflector wall was placed at the downstream end of the excavated rock plunge pool to deflect the high energy spillway jet from the riprapped slope leading to the downstream river channel. A vortex appearing in the preliminary horizontal bellmouth transition design from the intake towers to the 54-inch outlet works conduits was eliminated by raising the floor of the intake tower closer to the invert of the bellmouth. This design was later improved by using one intake tower for both outlet conduits placed at the same elevation. Discharge coefficients were given for both the spillway and the submerged 48-inch jet-flow gates. (Adams-ISWS)
W75-03110

DRAG-REDUCING POLYMER MOLECULAR WEIGHT EFFECTS ON TURBULENT DIFFUSION FOR UNIFORMLY DISTRIBUTED POLYMER INJECTION,
Advanced Technology Center, Inc., Dallas, Tex.
R. R. Walters.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-778 709, $4.25 in paper copy, $2.25 in microfiche. Report No B-94300/4CR-11, March 1974. 58 p, 11 fig, 1 tab, 9 ref, 3 append. ONR N00014-69-C-0214.

Descriptors: *Laboratory tests, *Turbulent flow, *Turbulent boundary layers, *Polymers, *Mass transfer, Diffusion, Velocity, Fluid friction, Profiles, Flow, Water, Pipe flow, Additives, Laboratory equipment, Energy dissipation, Injection.
Identifiers: *Drag reduction.

The effect of polymer molecular weight on turbulent diffusion and drag-reduction was investigated over a uniformly distributed polymer injection area. The purpose of the experiments, carried out in a porous wall pipe flow facility, was to determine optimum values of polymer molecular weight and injection mass flux for attaining maximum skin-friction reduction over a distributed injection area to investigate associated turbulent diffusion characteristics. It was found for this type of polymer supply system, which provided polymer directly to the required wall shear stress region, that the optimum molecular weight was approximately an order of magnitude less than that normally used in skin-friction reduction applications with homogeneous solutions and localized injection. The skin-friction reduction over an an active

distributed injection area appears to be a balance between the polymer's effectiveness at a given concentration and an attendant wall viscosity which adversely affects the skin-friction reduction. The changes in skin-friction reduction with polymer molecular weight were related directly to variations in the velocity profile characteristics. Empirical diffusion coefficients gave a quantitative determination of the effect of polymer molecular weight on turbulent diffusion reduction. (Humphreys-ISWS)
W75-03111

TURBULENT DRAG REDUCTION BY POLYACRYLIC ACID,
Massachusetts Inst. of Tech., Cambridge. Dept. of Chemical Engineering.
S. H. Banijamali, E. W. Merrill, K. A. Smith, and L. H. Peebles, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-778 040, $3.25 in paper copy, $2.25 in microfiche. Report No CED-DR-74-1, April 8, 1974. 14 p, 5 fig, 1 tab, 7 ref. ONR N00014-67-A-0204-0037.

Descriptors: *Laboratory tests, *Polymers, *Turbulent flow, Pipe flow, Fluid friction, Water, Additives, Aqueous solutions, Hydrogen ion concentration, Energy dissipation, Polyelectrolytes.
Identifiers: *Drag reduction, Polyacrylic acid.

Polyacrylic acid was synthesized to high molecular weight, then studied as a drag reducing agent in dilute solutions of variable pH and ionic strength, the polymer being in both non-ionized and polysalt forms. As the polymer varies from the non-ionized polycarboxylic acid in the form of a compact coil at pH 2 to the polycarboxylate salt in the form of a very highly extended coil in solutions by low ionic strength, its effectiveness in drag reduction continuously increases. The drag reducing properties of this polymer as a polysalt are completely in accord with most previous observations reported in the literature, and with extensive work previously done in laboratories. (Humphreys-ISWS)
W75-03112

CULVERT OUTLET PROTECTION DESIGN: COMPUTER PROGRAM DOCUMENTATION,
Wyoming State Highway Dept., Cheyenne.
M. G. Schilling.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 795, $8.50 in paper copy, $2.25 in microfiche. Report No FHWA-RD-74-501, January 1974. 243 p, 46 fig, 10 ref. DOT-FH-11-7936.

Descriptors: *Erosion control, *Riprap, *Energy dissipation, *Computer programs, Hydraulic design, Culverts, Scour, Hydraulic jump, Design, Outlets, Hydraulic structures, Settling basins.

A computer program was developed to estimate the scour extent at culvert outlets, and to design concrete and riprap stilling basins. Only local scour was considered. The program was developed in a modular framework to facilitate use of new and existing design methods. The types of erosion protection available include U.S. Army Waterways Experiment Station Estimate of Scour Extent, U.S. Army Waterways Experiment Station Rock Riprapped Basins, Colorado State University Rock Riprapped Basins, Vertical Stilling Well, St. Anthony Falls Stilling Basin, U.S. Bureau of Reclamation Type VI Basin, U.S. Bureau of Reclamation Type I Basin, U.S. Bureau of Reclamation Type II Basin, U.S. Bureau of Reclamation Type III Basin, U.S. Bureau of Reclamation Type IV Basin, and Colorado State University Smooth-Floor Flared Basin. Input, output, and operation of the program were described. Several examples were used to demonstrate use of the computer program. (Adams-ISWS)
W75-03116

ANNOTATED BIBLIOGRAPHY OF THE EFFECTS OF WATER ON THE DESIGN AND MANAGEMENT OF LAKE AND RIVER MARINAS,
Wisconsin Univ.-Parkside, Kenosha. Dept. of Earth Science.
For primary bibliographic entry see Field 5B.
W75-03171

SCOUR AND DEPOSITION--CHANGES IN SEDIMENTATION AROUND A NUCLEAR POWER PLANT,
Wisconsin Univ., Madison. Geo-Environmental and Mineral Resources Program.
For primary bibliographic entry see Field 2J.
W75-03178

SEDIMENTARY STRUCTURES OF A MODERN LAGOONAL ENVIRONMENT: PAMLICO SOUND, NORTH CAROLINA,
North Carolina Univ., Chapel Hill. Dept. of Geology.
M. P. Katuna, and R. L. Ingram.
Sea Grant Publication UNC-SG-74-14, August 1974. 117 p, 28 fig, 5 tab, 33 ref. NOAA 04-3-158-40.

Descriptors: *Estuaries, *Lagoons, *Sedimentary structures, Sediments, *North Carolina.
Identifiers: *Pamlico Sound(NC).

Twenty-two sampling areas were selected within Pamlico Sound and adjoining estuaries for the study of sedimentary structures. The lagoonal environment was divided into twelve subenvironments: shoreface, finger shoal, cross lagoon shoal, grassy shoal, tidal shoal, shelf, basin slope, central basin, mainland embayment, channel, inlet shoreface, and inlet channel. The assemblages of sedimentary structures which were used to define the active sedimentary environments within the Pamlico Sound lagoonal-estuarine complex can also be useful in interpreting similar modern analogs or ancient lagoonal and estuarine sequences. (NOAA)
W75-03180

ON THE STATISTICAL PROPERTIES OF WAVE FORCE,
North Carolina State Univ., Raleigh. Dept. of Civil Engineering.
C. C. Tung.
Sea Grant Publication, UNC-SG-74-11, June 1974. 18 p, 2 fig, 9 ref, 2 append. NOAA 04-3-158-40.

Descriptors: *Deep water, *Waves(Water), Statistical methods, Velocity, Numerical analysis, Fluid mechanics.
Identifiers: *Fluid particle velocity, *Wave force.

Expressions for some statistical quantities of wave field kinematics and wave forces on elements of a vertical cylinder in a random wave field are derived. Specifically, expressions for the mean and standard deviation of horizontal component of fluid particle velocity, acceleration and wave force on element of cylinder are derived. Numerical results are obtained for these quantities and presented graphically. For simplicity, only the case of unidirectional gravity wave field in deep water is considered. (Sinha-OEIS)
W75-03182

DETERMINATION OF EQUIVALENT RADII FOR RECTANGULAR DRAINS,
Arizona Univ., Tucson. Dept. of Soils, Water and Engineering.
A. W. Warrick.
Soil Science Society of America Proceedings, Vol 37, No 5, p 809-811, September-October, 1973. 2 fig, 8 ref.

Descriptors: *Drainage, *Subsurface drainage, Tile drainage, Drainage systems, *Drains, Drainage practices, Drainage engineering.

A relationship is developed giving the circular drain size which is equivalent to a rectangular drain. A rectangular drain may result when a highly permeable envelope of rectangular cross-section is used around a buried drainage tube. A plot of re/square root of (ab) is given as a function of a/b with re as the circular drain radius and a and b the semi-width and semi-height of the rectangular drain. The minimum value of re/square root of (ab) is 1.18 and corresponds to a square. The equivalent radius is useful in adapting drainage formulas giving spacings, depth etc., to rectangular drains. (Skogerboe-Colorado State)
W75-03232

8C. Hydraulic Machinery

APPARATUS FOR DREDGING DIVIDED SOLIDS SUBMERGED IN LIQUID,
For primary bibliographic entry see Field 5D.
W75-02855

METHOD AND APPARATUS FOR USE IN TUNNELLING,
P. Patin.
United States Patent 3,788,087. Official Gazette of the United States Patent Office, Vol 518, No 5, p 1745, January 29, 1974.

Descriptors: Engineering structures, Tunnels, *Tunnelling, *Tunnelling machines, Tunnel construction, *Pipes, Municipal wastes, *Patents.

A method and apparatus for use in tunnelling are described in which the terrain is supported by an annular fluid mass under pressure moved either continuously or stepwise. A lining compound is introduced outside the fluid mass and sets to form a tube. The tube may then be internally coated. (Merritt-FIRL)
W75-02857

SAN LUIS UNIT TECHNICAL RECORD OF DESIGN AND CONSTRUCTION: VOLUME IV. DESIGN, DOS AMIGOS PUMPING PLANT, PLEASANT VALLEY PUMPING PLANT,
Bureau of Reclamation, Denver, Colo.
A Water Resources Technical Publication, July 1974. 314 p, 169 fig, 14 tab, 103 ref. Price: $8.00.

Descriptors: *Water resources development, *California, *Irrigation water, Pumped storage, Projects, Reservoirs, Canals, Water Storage.
Identifiers: *Central Valley Project(Calif), *San Luis Unit(Calif).

The San Luis unit, a major addition to the Central Valley project of California is a multiple-purpose development on the west side of San Joaquin Valley, and provides irrigation, power, municipal and industrial water, recreational facilities, and fish and wildlife conservation. It includes facilities for storage of excess water from the Sacramento-San Joaquin Delta area that would normally flow into the Pacific Ocean. A large storage facility is needed because essentially all the precipitation in the San Joaquin and Sacramento watersheds occurs during the winter months while the major demand for water in the Central Valley occurs during the summer months. The main feature of the San Luis unit is two reservoirs, the San Luis Reservoir acting as the major storage reservoir and O'Neill Forebay acting as an equalizing basin for the upper stage dual-purpose pumping-generating plant. Pumps located at the base of O'Neill Dam take water from the Delta-Mendota Canal through the O'Neill Forebay Canal and discharge it into O'Neill Forebay. These pump-motors also act as turbine-generators during reverse flows through O'Neill Pumping Plant. (Knapp-USGS)
W75-03005

STAGE RECORDER WITH DIRECT FLOAT-TO-PEN LINKAGE,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
For primary bibliographic entry see Field 7B.
W75-03099

CIVIL ENGINEERING INVESTIGATIONS AND ECONOMIC STUDIES FOR THE PIEMAN RIVER POWER DEVELOPMENT,
Hydro-Electric Commission, Tasmania (Australia). Civil Engineering Div.
P. J. Jeffries.
Civil Engineering Transactions, I. E. Australia, Vol CE14, No 2, p 119-125, 1972. 11 fig, 1 tab, 5 ref.

Descriptors: *Water resource development, *Hydroelectric power, Cost analysis, Hydroelectric plants, Foreign countries, *Australia, Feasibility studies.
Identifiers: *Pieman River(Tasmania).

A series of investigations considering the feasibility of developing the hydroelectric capacity on the Pieman River are summarized. The 1500 square mile catchment of the river is located on the mountainous west coast of Tasmania. The Pieman River is fed by two principal tributaries--the Murchison and Mackintosh Rivers. The catchment is characterized by deeply set rivers, numerous ridges, and thickly timbered rain forests. While the river possesses a low-head profile, a high-average flow sustains its ability to support hydroelectric power plants. Comprehensive geological and economic surveys suggest that the final developmental plan be composed of three schemes involving rock or gravel dams on the Mackintosh, Murchison, Rosenberry, and Pieman Rivers, having turbine capacities of 83, 0, 81, and 285 MW, respectively. At various times consideration was given to separating the project in two--the first dealing with plans on the first three rivers while the second restricted to only the Pieman. Estimated capital costs for the two project plans are $60,644,000 and $71,292,000, respectively. A combined building program would cost $113,404,000. Special investigation techniques and problems involved in flood hydrology, sluicing foundations, and spillways are discussed. (Schroeder-Wisconsin)
W75-03146

TERTIARY PLANT HAS SUPPLIER-INSTALLED AUTOMATIC CONTROL SYSTEM.
For primary bibliographic entry see Field 5D.
W75-03223

8D. Soil Mechanics

INCREASING HEIGHT OF LEVEES ALONG RIO GRANDE UPSTREAM FROM RETAMAL DAM AND ALONG MAIN AND NORTH FLOODWAYS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
International Boundary and Water Commission, El Paso, Tex.
For primary bibliographic entry see Field 4A.
W75-02971

8F. Concrete

THREE-ELEMENT FORMING SPEEDS CONCRETE PIPE JOB,
D. C. Etheridge.
Construction Methods and Equipment, Vol 55, No 12, p 54-56, December, 1973.

Descriptors: Engineering structures, *Storm drains, Pipes, *Concrete pipes, Municipal wastes.
Identifiers: Inflataform, Slipform.

The in-place production of a large diameter concrete storm drain on a nearly continuous basis is described. The 66-inch-ID pipeline advances 320 feet each 4-5 hour work day, formed externally up to its springline in a 12-foot deep smooth-walled trench; crowned by a slipforming machine; and shaped internally to 6 1/2 inch wall thickness by a tough, adjustably inflatable sausage-shaped balloon 325 feet long. The Fullerform process of the Lomar Company works best in firm, clayey, rock-free soil, and demands both backhoe and slipform operator skill, and machine dependability. The presence on any site of excessive amounts of sand or stone would rule out this approach. A backhoe with specially toothed and round-lipped bucket excavates trench to finished pipeline OD and grade. Slipform alignment is controlled by a U-shaped shield. A raised portion at the rear houses concrete hopper with diverter that splits concrete between invert and crown. Reinforced polyurethane Inflataform is unfolded and laid along the trench inside the slipform, prior to filling it with air. The pipeline can be installed with just eight men, including a superintendent. (Merritt-FIRL)
W75-02864

8G. Materials

INSERTED PIPE REPAIRS OUTFALL IN 3 1/2 DAYS.
Western Construction, Vol 48, No 11, p 53, 64, November, 1973.

Descriptors: *Outlets, *Outfall sewers, *Plastic pipes, Concrete pipes, Shores, *Linings.
Identifiers: Sclairpipe, Relining project.

A relining project using 2600 feet of 32 inch diameter high density polyethylene pressure pipe in a deteriorating ocean outfall is described. The operation was completed in only three and one-half days, during which one hundred feet of existing concrete cylinder pipe was cut out close to the shore to provide a point of access from which to insert the new pipe. The pipe called Sclairpipe has a wall thickness of .978 inch. Sixty foot lengths of plastic pipe were butt-fused together. A steel cable running from a steel spider band through a pulley attached to the concrete cylinder pipe was pulled by a tractor feeding the polyethylene pipe into the outfall. A special steel nosecone was attached to the lead end to keep the pipe from snagging. Back flow of effluent from the concrete diffuser into the annular space between the polyethylene and concrete diffuser into the annular space between the polyethylene and concrete pipes was prevented by keeping the space filled with water under enough pressure to hold back the effluent. (Merritt-FIRL)
W75-02868

UNGRADED GLASS TO SEWER PIPE,
Brookhaven National Lab., Upton, N.Y.
M. Steinberg.
The Glass Industry, Vol 54, No 13, p 14-15, 22, December, 1973.

Descriptors: *New York, Pipes, *Sewers, *Recycling, *Cities, City planning.
Identifiers: Hungtington(NY), Long Island, *Glass pipes, Ungraded glass pipes, *Glass polymer composit.

The development and use of sewer pipes made from ungraded bottle glass bonded with polymers in a municipal sewer line in Huntington, Long Island are described. The monomer concentration for ungraded glass is 13-16 percent by weight compared to 9-10 percent for graded glass. Ambient promoter-catalyst systems are used in production, and silane is included to promote adhesion to the glass. Glass polymer composite (GPC) curing was carried out at 70C for 4-8 hours. The GPC cured material is 2-4 times stronger than ordinary concrete; its chemical durability surpasses concrete; and it is resistant to sulfuric acid. The costs associated with it are competitive with other materials, particularly in the 8-24 inch size range. A sewer pipe was chosen as the first application because of possible savings in landfill. There appears to be a good match between the waste glass generated in an urban community and the market for sewer pipe. (Merritt-FIRL)
W75-02875

DEVELOPMENT OF METHODS FOR CONTROLLING THE CADMIUM AND ZINC CONTENT OF WATER,
Rhode Island Univ., Kingston. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5B.
W75-02892

TURBULENT DRAG REDUCTION BY POLYACRYLIC ACID,
Massachusetts Inst. of Tech., Cambridge. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 8B.
W75-03112

SORTING OUT IRON IN WATER SUPPLIES,
Ontario Ministry of the Environment, Toronto (Ontario). Pollution Control Branch.
For primary bibliographic entry see Field 5F.
W75-03230

8I. Fisheries Engineering

LAKE ERIE BOTTOM TRAWL EXPLORATIONS, 1962-66,
Bureau of Commercial Fisheries, Ann Arbor, Mich. Exploratory Fishing and Gear Research Base.
For primary bibliographic entry see Field 2H.
W75-02804

HYDROLOGY AND TROUT POPULATIONS OF COLD WATER RIVERS OF MICHIGAN AND WISCONSIN,
Geological Survey, Madison, Wis.
For primary bibliographic entry see Field 2E.
W75-02819

OBJECTIVES AND PROBLEMS OF MANAGING AQUATIC LIVING RESOURCES,
National Marine Fisheries Service, Seattle, Wash. Northwest Fisheries Center.
For primary bibliographic entry see Field 6B.
W75-02869

INTERACTION BETWEEN FISHERY MANAGEMENT AND ENVIRONMENTAL PROTECTION,
Bedford Inst., Dartmouth (Nova Scotia). Marine Ecology Lab.
For primary bibliographic entry see Field 6G.
W75-02870

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9A. Education (Extramural)

NEW AIDS AND METHODS FOR TEACHING HYDROLOGY,
Texas Univ., Austin. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W75-03040

10. SCIENTIFIC AND TECHNICAL INFORMATION

10B. Reference and Retrieval

HYDROLOGIC DATA BANK USERS GUIDE,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 7C.
W75-02796

DIGITIZATION AND COMPUTERIZATION OF RIVER SYSTEM COORDINATE GEOMETRY,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 7C.
W75-02880

10C. Secondary Publication And Distribution

CHEMICAL ADDITIVES TO CONTROL OIL SPILLS--A STATE OF THE ART SUMMARY,
Rensselaer Polytechnic Inst., Troy, N.Y.
For primary bibliographic entry see Field 05B.
W75-02808

DEVELOPMENT OF A MONTHLY MUNICIPAL TECHNOLOGY BULLETIN,
Franklin Inst. Research Labs., Philadelphia, Pa.
For primary bibliographic entry see Field 05D.
W75-03051

COASTAL ZONE BIBLIOGRAPHY (ANNOTATED).
Delaware State Planning Office, Dover.
For primary bibliographic entry see Field 02L.
W75-03109

OCEAN ENGINEERING AND OCEANOGRAPHY TECHNICAL LITERATURE COLLECTION, WATER RESOURCES CENTER ARCHIVES,
California Univ., Berkeley. Hydraulic Engineering Lab.
For primary bibliographic entry see Field 02L.
W75-03113

ANNOTATED BIBLIOGRAPHY OF THE EFFECTS OF WATER ON THE DESIGN AND MANAGEMENT OF LAKE AND RIVER MARINAS,
Wisconsin Univ.-Parkside, Kenosha. Dept. of Earth Science.
For primary bibliographic entry see Field 05B.
W75-03171

10D. Specialized Information Center Services

DESIGN OF ENVIRONMENTAL INFORMATION SYSTEMS.
Michigan Univ., Ann Arbor. School of Public Health.
For primary bibliographic entry see Field 06G.
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DEVELOPMENT OF A MONTHLY MUNICIPAL TECHNOLOGY BULLETIN,
Franklin Inst. Research Labs., Philadelphia, Pa.
For primary bibliographic entry see Field 05D.
W75-03051

10F. Preparation Of Reviews

CHEMICAL ADDITIVES TO CONTROL OIL SPILLS--A STATE OF THE ART SUMMARY,
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For primary bibliographic entry see Field 05B.
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